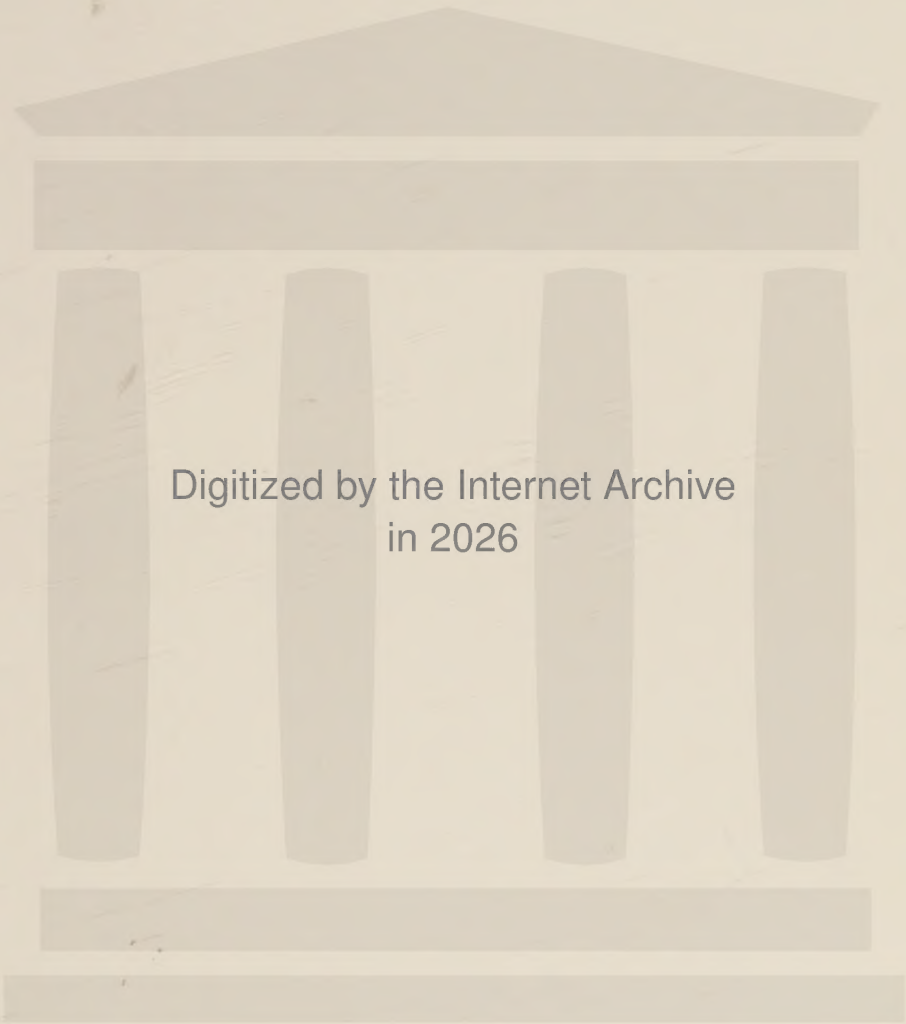
GEO A FLOHR CO.
LIBRARY
JUN 24 1970
BINDERS

DISCARDED


Digitized by the Internet Archive
in 2026

https://archive.org/details/dictionaryofphil0000jame_k1k5

DICTIONARY

OF

PHILOSOPHY AND PSYCHOLOGY

DICTIONARY

OF

PHILOSOPHY AND PSYCHOLOGY

INCLUDING

MANY OF THE PRINCIPAL CONCEPTIONS OF ETHICS, LOGIC, AESTHETICS, PHILOSOPHY OF RELIGION, MENTAL PATHOLOGY, ANTHROPOLOGY, BIOLOGY, NEUROLOGY, PHYSIOLOGY, ECONOMICS, POLITICAL AND SOCIAL PHILOSOPHY, PHILOLOGY, PHYSICAL SCIENCE, AND EDUCATION

AND GIVING

A TERMINOLOGY IN ENGLISH, FRENCH, GERMAN, AND ITALIAN

WRITTEN BY MANY HANDS

AND EDITED BY

JAMES MARK BALDWIN

PH.D. (PRINCETON), HON. D.SC. (OXON.), HON. LL.D. (GLASGOW)

STUART PROFESSOR IN PRINCETON UNIVERSITY

WITH THE CO-OPERATION AND ASSISTANCE OF AN INTERNATIONAL BOARD OF CONSULTING EDITORS

IN THREE VOLUMES

WITH ILLUSTRATIONS AND EXTENSIVE BIBLIOGRAPHIES

VOL. II

New York

THE MACMILLAN COMPANY

London

MACMILLAN AND CO., LIMITED

1902

103
B19
V.2

Oxford
HORACE HART, PRINTER TO THE UNIVERSITY

COLLABORATORS

Signatures.

EDITOR:

(J. M. B.) Professor J. Mark Baldwin, Princeton University.

CONSULTING EDITORS:

For English.

(J. D.) Professor John Dewey, Chicago University.
(W. J.) Professor William James, Harvard University.
(E. B. P.) Professor E. B. Poulton, Oxford University.
(A. S. P. P.) Professor Andrew Seth Pringle-Pattison, Edinburgh University.
(H. S.) Professor H. Sidgwick[1], Cambridge University.
(G. F. S.) Dr. G. F. Stout, University Reader, Oxford.

For French.

(Y. D.) Professor Yves Delage, Sorbonne (Faculté des Sciences), Paris.
(Th. F.) Professor Th. Flournoy, Geneva University.
(P. J.) Professor Pierre Janet, Collège de France.
(L. M.) L. Marillier[1], Lecturer, Sorbonne (Hautes Études), Paris.

For German.

(S. E.) Professor S. Exner, Vienna University.
(K. G.) Professor K. Groos, University of Giessen.
(H. M.) Professor Hugo Münsterberg, Harvard University.
(Th. Z.) Professor Th. Ziehen, University of Utrecht.

For Italian.

(E. M.) Professor E. Morselli, Genoa University.
(G. V.) Professor G. Villa, Liceo Tasso, Lecturer, University of Rome.

ASSOCIATE EDITORS:

For Logic and Psychology.

(C. L. F.) Mrs. C. Ladd-Franklin, Baltimore.

For Bibliography.

(H. C. W.) Professor H. C. Warren, Princeton University.

EDITOR'S ASSISTANTS:

For Biography.

Professor G. A. Tawney, Beloit College.

For Philology.

Professor W. M. Urban, Ursinus College.

CONTRIBUTORS[2]*:*

Philosophy.

(A. C. A. Jr.) Professor A. C. Armstrong, Jr., Wesleyan University.
(B. B.) Dr. B. Bosanquet, Oxshott, Surrey, England.
(J. D.) Professor John Dewey, Chicago University.
(H. N. G.) Professor H. N. Gardiner, Smith College.
(G. E. M.) G. E. Moore, Fellow of Trinity College, Cambridge.
(A. S. P. P.) Professor Andrew Seth Pringle-Pattison, Edinburgh University.
(J. R.) Professor Josiah Royce, Harvard University.
(E. T. S.) Professor E. T. Shanahan, Catholic University, Washington.
(R. H. S.) R. H. Stetson, Harvard University.

Logic.

(R. A.) Professor R. Adamson[1], Glasgow University.
(C. L. F.) Mrs. C. Ladd-Franklin, Baltimore.
(C. S. P.) Dr. C. S. Peirce, Milford, Pike Co., Pennsylvania.

Ethics.

(J. S.) Professor James Seth, Edinburgh University.
(W. R. S.) Professor W. R. Sorley, Cambridge University.

[1] Deceased.

[2] The names of contributors are given in this list under one subject only, although in many cases they have written in other subjects as well.

Psychology.

(J. McK. C.) Professor J. McK. Cattell, Columbia University.
(E. C. S.) Professor E. C. Sanford, Clark University.
(E. M. S.) Mrs. H. Sidgwick, Principal, Newnham College, Cambridge.
(G. F. S.) Dr. G. F. Stout, University Reader, Oxford.
(E. B. T.) Professor E. B. Titchener, Cornell University.
(H. C. W.) Professor H. C. Warren, Princeton University.
(J. M. B.) The Editor.

Philology.

(B. I. W.) President B. I. Wheeler, University of California.

Physical Science and Mathematics.

(J. S. A.) Professor J. S. Ames, Johns Hopkins University.
(E. W. D.) Professor Ellery W. Davis, University of Nebraska.
(H. B. F.) Professor H. B. Fine, Princeton University.
(S. N.) Professor Simon Newcomb, Washington.

Mental Pathology and Anthropology.

(J. J.) Professor J. Jastrow, Wisconsin University.
(A. M.) Dr. Adolf Meyer, Worcester, Mass., Insane Asylum.

Biology.

(C. B. D.) Professor C. B. Davenport, Chicago University.
(E. S. G.) E. S. Goodrich, Lecturer, Oxford University.
(C. S. M.) Professor C. S. Minot, Harvard University.
(C. Ll. M.) Principal C. Lloyd Morgan, University College, Bristol.
(E. B. P.) Professor E. B. Poulton, Oxford University.
(W. F. R. W.) Professor W. F. R. Weldon, Oxford University.

Economics.

(A. T. H.) President A. T. Hadley, Yale University.

Political and Social Philosophy.

(J. B.) Dr. James Bonar, Civil Service Commission, London.
(F. H. G.) Professor F. H. Giddings, Columbia University.
(F. C. M.) F. C. Montague, Oriel College, Oxford.
(W. D. M.) Dr. W. D. Morrison, London.

Law.

(S. E. B.) Judge S. E. Baldwin, Connecticut Supreme Court of Appeals; Professor, Yale University.

Philosophy of Religion.

(E. G. B.) E. G. Browne, Lecturer, Cambridge University.
(J. E. C.) Rev. J. Estlin Carpenter, Manchester College, Oxford.
(A. T. O.) Professor A. T. Ormond, Princeton University.
(R. M. W.) Professor R. M. Wenley, Michigan University.

Education.

(C. De G.) Professor C. De Garmo, Cornell University.

Aesthetics.

(J. R. A.) Professor James R. Angell, Chicago University.
(J. H. T.) Professor J. H. Tufts, Chicago University.

Neurology and Physiology.

(H. H.)[1] President C. L. Herrick, University of New Mexico.
Professor C. J. Herrick, Denison University.
(C. F. H.) Professor C. F. Hodge, Clark University.

Bibliography.

(B. R.) Dr. Benj. Rand, Harvard University.

ADDITIONAL CONTRIBUTORS TO VOL. II.

(L. C.) Professor Louis Couturat, University of Toulouse.
(V. W.) Lady Victoria Welby, London.
(T. F. W.) Dr. T. F. Wright, Boston.

[1] Joint authorship.

PREFATORY NOTE

With this volume the text of the Dictionary is completed. The Editor has nothing to add to the explanations given in the Preface to Vol. i; but it is his sad duty to record the death of two more of our collaborators. One of these, M. Léon Marillier of the Sorbonne, a member of the Board of Consulting Editors, gave time and labour generously to the determination of the French equivalents, and all those who use the Dictionary are indebted to him. His death is a severe blow, especially to the study of Comparative Religion, but also to that of Philosophy and Psychology. The other, Professor Adamson of Glasgow, contributed many articles on Logic, mainly to the first volume. His eminence in the department of Philosophy is well known to all readers of the work.

The Editor wishes to thank correspondents and reviewers for bringing to his notice various minor errors in Vol. i. The indulgent criticism so far made of the work encourages the editorial staff. Only on two points has the book been somewhat misjudged: we are not in any sense slighting Greek and Latin philosophy, and the remarks in the General Preface do not mean to suggest that we are. As it happens, much of the historical matter on classical thought is in the present volume. And, again, we are not in any way claiming that the treatment of biography is more than the proverbial 'part of a loaf'; it was a question, indeed, of part of a loaf or no bread. The bibliographies of Vol. iii will supplement the biographical notices, of course, very essentially.

The Dictionary is indebted for special articles to the new contributors mentioned at the end of the list of Collaborators given in this volume; and also to Professor Fabian Franklin of Baltimore, who gave his co-operation in the preparation of the article on 'Probability,' to which his initials (F.F.) are attached. On the other hand, the connection of Dr. Tosti with the work ceased with the issue of the first volume.

The Editor finds himself also under very great obligations to those who prepared the exhaustive Indexes; their names are given in connection with their respective lists.

THE EDITOR.

Princeton,
June, 1902.

CONTENTS

VOLUME I:

LIST OF COLLABORATORS.

EDITOR'S PREFACE.

TABLE OF CONTENTS.

ABBREVIATIONS:—I. Of Terms.
II. Of Titles of Journals, &c.

TEXT—**A** to **Laws**.

VOLUME II:

PREFATORY NOTE.

TEXT—**Le** to **Z**.

ADDENDA: INDICES—

I. Greek Terms.
II. Latin Terms.
III. German Terms.
IV. French Terms.
V. Italian Terms.

VOLUME III:

PREFATORY NOTE.

GENERAL BIBLIOGRAPHIES.

I. General.
II. Bibliography A. History of Philosophy.
III. „ B. Systematic Philosophy.
IV. „ C. Logic.
V. „ D. Aesthetics.
VI. „ E. Philosophy of Religion.
VII. „ F. Ethics.
VIII. „ G. Psychology.

(See the detailed Table of Contents in Volume III.)

ABBREVIATIONS

I. ABBREVIATIONS OF TERMS OCCURRING IN TITLES OF JOURNALS AND OTHER PUBLICATIONS

a.	= aus, an.
Abhandl.	= Abhandlung.
Abstr.	= Abstract.
Abth.	= Abtheilung.
Acad., Accad., Akad.	= Academy, &c.
Addr.	= Addresses.
Adv.	= Advancement.
Aesth.	= Aesthetic, &c.
Ak.	= Akustik.
Alien.	= Alienist.
allg.	= allgemein.
Amer.	= American.
Anat.	= Anatomy, Anatomical, &c.
angew.	= angewandt.
Ann.	= Annals, &c.
Anthropol.	= Anthropological, Anthropology, &c.
Anthropom.	= Anthropometry.
Antiq.	= Antiquities.
Antol.	= Antologia.
Anz.	= Anzeiger.
Aphor.	= Aphorismen.
Arb.	= Arbeiten.
Arch., Ark.	= Archives, &c.
Archaeol.	= Archaeological, &c.
art.	= article.
Assoc.	= Association.
Aufl.	= Auflage.
Augenh.	= Augenheilkunde.
Ausg.	= Ausgabe.
Beitr.	= Beiträge.
Belg.	= Belgique, &c.
Ber.	= Bericht.
Berl.	= Berliner.
Bib.	= Biblical.
Bibliog.	= Bibliography, Bibliographical, &c.
Biblioth.	= Bibliothèque.
Biog.	= Biography, &c.
Biol.	= Biological, &c.
Bk.	= Book.
Bl.	= Blatt.
Bost.	= Boston.
Brit.	= British, Britannica.
Brux.	= Bruxelles.
Bull., Boll.	= Bulletin, &c.
C. R.	= Comptes Rendus.
Cal.	= California.
Canad.	= Canadian.
Cathol.	= Catholic, &c.
Cent.	= Century.
Centralbl.	= Centralblatt.
Chir., Cirug.	= Chirurgical, &c.
Chrét., Christ.	= Chrétienne, Christian, &c.
Cien.	= Ciencia.
Circ.	= Circulars.
Cirug.	= Cirugía.
Clin.	= Clinical, &c.
Co., Comp.	= Company.
Comm.	= Commission.
Comm'r, Comm'rs.	= Commissioner, &c.
Commun.	= Communication, &c.
Compar.	= Comparative.
Cong.	= Congress.
Contemp.	= Contemporary.
Contrib.	= Contributions.
Corresp.	= Correspondenz.
Crim.	= Criminal, &c.
Criminol.	= Criminology.
Crit.	= Critical.
Cyc	= Cyclopedia.
d.	= de, der, &c.
Descrip.	= Descriptive.
deutsch.	= deutscher, &c.
Devel.	= Development(al).
Dict.	= Dictionary, &c.
Dis.	= Disease.
Diss.	= Dissertation.
Eccles.	= Ecclesiastical.
Econ.	= Economics, Economy, &c.
ed.	= edited, edition.
Educ.	= Education, &c.
Electr.	= Electric, &c.
Electro-biol.	= Electro-biology, &c.
Encyc. Brit.	= Encyclopaedia Britannica.
Eng. trans.	= English translation.
Enseignem.	= Enseignement.
Entomol.	= Entomology, &c.
Entwickelungsmech.	= Entwickelungsmechanik.
Ét.	= Étude.
Eth.	= Ethical, Ethics.
Ethnol.	= Ethnology.
Exam.	= Examination.
Exper.	= Experimental, &c.
Explan.	= Explanatory.
f.	= für.
Fasc.	= Fascicule.
Filos., Filoz.	= Filosofia, &c.
Fortn.	= Fortnightly.

Fortsch.	= Fortschritt.
Fr.	= French.
Franç.	= Français.
Freniat.	= Freniatria.
Gaz., Gac.	= Gazette, &c.
Geb.	= Gebiet.
Gen.	= General.
Geneesk.	= Geneeskunde.
Geol.	= Geology, &c.
Ger.	= German.
gerichtl.	= gerichtlich.
ges.	= gesammt.
Gesch.	= Geschichte.
Gesell.	= Gesellschaft.
Gior.	= Giornale.
H.	= Heft.
Habil.	= Habilitationsschrift.
Handb.	= Handbook, Handbuch.
Handwörterb.	= Handwörterbuch.
Heilk., -hk.	= Heilkunde.
Hist.	= History, &c.
Hôp.	= Hôpital.
Hosp.	= Hospital.
Hypnot.	= Hypnotism, &c.
I, Ist.	= Istituto.
Icon.	= Iconoclast, Iconography, &c.
imman.	= immanent, &c.
Inaug.	= Inaugural.
Inebr.	= Inebriates, Inebriety.
Inq.	= Inquiry.
Insan.	= Insanity.
Inst.	= Institute, Institution, &c.
Int.	= International.
Interméd.	= Intermédiaire.
Intermed.	= Intermediate.
Interpret.	= Interpretation.
Introd.	= Introduction.
Ital.	= Italian.
J.	= Journal.
Jahrb.	= Jahrbuch.
Jahresber.	= Jahresbericht.
Jahrg.	= Jahrgang.
Just.	= Justinian.
k., kgl.	= königlich.
Kantstud.	= Kantstudien.
klin.	= klinisch.
krim.	= kriminal.
Kriminol.	= Kriminologie.
krit., Krit.	= kritisch, Kritik, &c.
Lab.	= Laboratory.
Lanc.	= Lancisiana.
Laryng.	= Laryngoscope, Laryngotomy, &c.
Laryngol.	= Laryngology, -ist, &c.
Lects.	= Lectures.
Legisl.	= Legislation.
Lehrb.	= Lehrbuch.
Lfg.	= Lieferung.
Linn.	= Linnaean.
Lit.	= Literary, Literature.
Mag.	= Magazine.
Med., Méd.	= Medicine, Medical, &c.
Med.-Chir.	= Medico-Chirurgical, &c.
Med.-Psychol., &c.	= Medico-Psychological, &c.
Mém.	= Mémoires.
Mens.	= Mensuel, -elle.
Ment.	= Mental, &c.
Met., Mét.	= Metaphysics, &c.
Meth.	= Method.
Microg.	= Micrographic, &c.
Microsc., mikr.	= Microscopy, Microscopical, mikroskopisch, &c.
Mitth., Mitt.	= Mittheilungen.
Mo.	= Monthly.
Mod.	= Modern, &c.
Monatsbl.	= Monatsblatt.
Monatsh.	= Monatsheft.
Monatssch.	= Monatsschrift.
Monog.	= Monograph.
Mor.	= Morals, Moral.
Morphol.	= Morphology, &c.
Münch.	= Münchener.
Mus.	= Museum.
N. S.	= New Series.
N. Y.	= New York.
Nat.	= Natural.
Natnl.	= National.
Natural.	= Naturalist, &c.
Naturf.	= Naturforscher.
Naturw.	= Naturwissenschaft.
nederl.	= nederlandsch.
Néo-Scol.	= Néo-Scolastique.
Nerv.	= Nervous, &c.
Nervenh.	= Nervenheilkunde.
Neurasth.	= Neurasthenia, &c.
Neurol., Névrol.	= Neurology, &c.
Neurot.	= Neurotomy, &c.
Nic.	= Nicomachean.
No.	= Number.
Norm.	= Normal.
Nouv.	= Nouveau, &c.
Nov.	= Novum.
Ocul.	= Oculiste, &c.
Offenb.	= Offenbarung.
Ohrenh.	= Ohrenheilkunde.
Ophthal., Ottal.	= Ophthalmology, Ophthalmic, &c.
Org.	= Organum.
Orific.	= Orifical.
Osp.	= Ospedale.
Osteol.	= Osteology, &c.
Otol.	= Otology, &c.
Päd.	= Pädagogik, &c.
Pathol., Patol.	= Pathology, &c.
Pedag.	= Pedagogy, &c.
Perc.	= Perception.
Phar.	= Pharyngologie.
Philol.	= Philology, &c.
Philos.	= Philosophy, &c.
Phys.	= Physical.
Physiol.	= Physiology, &c.
Pogg.	= Poggendorff.
Policl.	= Policlinic, &c.
Polit.	= Political.
Pop.	= Popular.
Pract.	= Practical.
prakt.	= praktisch.
Pref.	= Preface.
Pres.	= Presidential.
Presb.	= Presbyterian.
Princ.	= Principles.
Proc.	= Proceedings.

Prog.	= Program, Programmabhandlung.
Psych.	= Psychic, Psychical.
Psychiat.	= Psychiatry, &c.
Psychol., Psicol., &c.	= Psychology, &c.
Pt.	= Part.
Publ., publ.	= Publications, published by.
Quart.	= Quarterly.
Quest.	= Questionnaire, Questions.
Quind.	= Quindicinale.
R.	= Reale (Ital.).
Rdschau.	= Rundschau.
Rec.	= Record, Recueil.
Ref.	= Reference, Reformed.
Rendic.	= Rendiconti.
Rep.	= Report.
Rep'r.	= Reporter.
Res.	= Research.
Rev.	= Review, &c.
rev.	= revised.
Rhinol.	= Rhinology.
Riv.	= Rivista.
Roy.	= Royal.
S.	= Series.
Samml.	= Sammlung.
Schol.	= Scholastic.
Sci.	= Science.
Scient.	= Scientific.
Sciol.	= Sciolism, Sciolistic.
Sem.	= Seminary, Seminar.
Semej.	= Semejotica.
Sent.	= Sentiments.
Sitzber.	= Sitzungsbericht.
Skand.	= Skandinavian.
Smithson.	= Smithsonian.
Soc.	= Society, Social.
Sociol.	= Sociology.
Span.	= Spanish.
Specul.	= Speculative.
spek.	= spekulativ.
Sperim.	= Sperimentale (Italian).
Staatswiss.	= Staatswissenschaft.
Stat.	= Station.
Statist.	= Statistics, &c.
Stud.	= Studies, Studien.
Suppl.	= Supplement, &c.
Surg.	= Surgery, Surgical.
Syst.	= System.
System.	= Systematic, systematisch, &c.
Theol.	= Theology, &c.
Therap.	= Therapeutic, &c.
Thom.	= Thomiste.
Tijd.	= Tijdskrift.
trad.	= traduit.
Trans.	= Transactions.
trans. (Eng. &c.)	= translation (English, &c.).
Trav.	= Travaux.
Treat.	= Treatise.
Trib.	= Tribune.
Trimest.	= Trimestriel.
ü.	= über.
u.	= und.
Uebers.	= Uebersetzt.
Univ.	= University.
Univl.	= Universal.
Untersuch.	= Untersuchungen.
v.	= von.
Ver.	= Verein.
verb.	= verbesserter.
Verh.	= Verhandlung.
verm.	= vermehrte.
Vocab.	= Vocabulary.
vol.	= volume.
Vortr.	= Vorträge.
Vorw.	= Vorwort.
Vtljsch.	= Vierteljahrsschrift.
Wien.	= Wiener.
Wisc.	= Wisconsin.
Wiss., wiss.	= Wissenschaft, wissenschaftlich.
Wochensch.	= Wochenschrift.
Wörterb.	= Wörterbuch.
z.	= zur, zum.
Zool.	= Zoology, &c.
Zeit.	= Zeitung.
Zeitsch.	= Zeitschrift.

II. ABBREVIATIONS OF TITLES OF JOURNALS AND OTHER PUBLICATIONS

Abhandl. d. k. sächs. Gesell. d. Wiss.
Abhandl. d. physiol. Gesell. zu Berlin
Abhandl. z. Philos.
Acad. R. Méd.-Chir. d. France
Addr. and Proc. Natnl. Educ. Assoc.
Alien. and Neurol.
Allg. Päd.
Allg. Wien. med. Zeit.
Allg. Zeitsch. f. Psychiat.
Amer. Anthropol.
Amer. J. Med. Sci.
Amer. J. of Insan.
Amer. J. of Ophthal.
Amer. J. of Physiol.
Amer. J. of Psychol
Amer. J. of Sci.
Amer. J. of Sociol.
Amer. Med.-Surg. Bull.
Amer. Natural.
Amer. Phys. Educ. Rev.
Amer. Presb. Rev.
Anat. Anz.
Anat. Hefte
Ann. Amer. Acad. Polit. and Soc. Sci.
Ann. Clin. de Bordeaux
Ann. d. Mal. de l'Oreille
Ann. d'Ocul.
Ann. d. Physik u.Chemie (or Wiedemann's Ann.)
Ann. d. Sci. Nat.
Ann. d. Sci. Psych.
Ann. de Microg.
Ann. de Philos. Chrét.
Ann. de Psychiat.
Ann. di Freniat.
Ann. di Neurol.
Ann. di Otol.
Ann. di Ottal.
Ann. of Otol., Rhinol., and Laryngol.
Ann. Méd.-Psychol.
Ann. Soc. Roy. d. Sci. Méd. et Nat. de Brux.
Année Biol.
Année Philos.
Année Psychol.
Année Sociol.
Annual Encyc.
Anomalo
Anthropol.
Antiq. Rom. Syntagma
Arch. Clin. de Bordeaux
Arch. d'Anat. Microsc.
Arch. d'Anthropol. Crim.
Arch. de Neurol.
Arch. d'Ophthal.
Arch. de Physiol.
Arch. di Psichiat.
Arch. f. Anat. u. Entwickelungsgesch.
Arch. f. Anat. u. Physiol.—Physiol. Abth.
Arch. f. Anat. u. Physiol.—Anat. Abth.
Arch. f. Augenh.
Arch. f. d. ges. Physiol. (or Pflüger's Arch.)
Arch. f. Entwickelungsmech.
Arch. f. exper. Pathol.
Arch. f. Gesch. d. Philos.
Arch. f. krim. Anthropol.
Arch. f. Laryngol. u. Rhinol.
Arch. f. mikr. Anat.
Arch. f. Ohrenh.
Arch. f. Ophthal. (or v. Graefe's Arch.)
Arch. f. pathol. Anat. (or Virchow's Arch.)
Arch. f. Psychiat.
Arch. f. Religionswiss.
Arch. f. syst. Philos.
Arch. Int. de Laryngol. et d'Otol.
Arch. Ital. d. Biol.
Arch. Ital. di Laringol.
Arch. of Neurol. and Psychopathol.
Arch. of Ophthal.
Arch. of Otol.
Arena
Atlantic Mo.
Atti R. Accad. d. Lincei
Atti Soc. Rom. di Antropol.

Beitr. z. Ak. u. Musikwiss.
Beitr. z. Augenh. (Deutschmann's)
Beitr. z. exper. Psychol.
Beitr. z. pathol. Anat.
Beitr. z. Psychol. u. Philos.
Ber. d. k. sächs. Gesell. d. Wiss.
Ber. d. Senckenberg. Naturf.-Gesell.
Berl. klin. Wochensch.
Bern. Stud. z. Philos.
Bibliog. Anat.
Biol. Centralbl.
Biol. Lectures
Biol. Untersuch. (Retzius's)
Blackwood's Mag.
Boll. d. Soc. di Natural. in Napoli
Boll. d. Policlin. Gen. di Torino
Boll. d. Soc. Lanc. d. Osp. di Roma
Boll. d. Soc. Med.-Chir. di Pavia
Boston Med. and Surg. J.
Brain
Brit. Med. J.
Brit. Quart. Rev.
Bull. Acad. de Méd.

Bull. Amer. Acad. Med.
Bull. Johns Hopkins Hosp.
Bull. Méd.
Bull. Mus. Compar. Zool. Harvard Coll.
Bull. Soc. d'Anthropol. d. Paris
Bull. Soc. d. Méd. Ment. d. Belg.
Bull. Soc. Franco-Belg.
Bull Soc. Roy. d. Sci. Méd. et Nat. d. Brux.
Bull. Soc. Zool. d. France
Bull. Univ. of Wisc.

Cathol. Univ. Bull.
Cellule
Centralbl. f. allg. Pathol. u. pathol. Anat.
Centralbl. f. Anthropol.
Centralbl. f. med. Wiss.
Centralbl. f. Nervenh. u. Psychiat.
Centralbl. f. Physiol.
Centralbl. f. prakt. Augenh.
Century Mag.
Child-Study Mo.
Cleveland Med. Gaz.
Columbia Univ. Bull.
Columbia Univ. Contrib. to Philos.
Commun. all' Accad. Med.-Chir. di Napoli
Compar. Embryol.
Contemp. Rev.
Corresp.-Bl. d. deutsch. anthropol. Gesell.
Course in Exper. Psychol.
C. R. Acad. d. Sci.
C. R. Acad. d. Sci. Mor. et Pol.
C. R. Soc. de Biol.

Deutsch. Arch. f. klin. Med.
Deutsch. med. Wochensch.
Deutsch. med. Zeit.
Deutsch. Rdschau.
Deutsch. Rev.
Deutsch. Zeitsch. f. Nervenh.
Dict. de Physiol.

Edinburgh Med. J.
Education
Educ. Rev.
Encyc. Brit.
Ét. publ. p. Pères Comp. d. Jésus
Eth. Nic.
Eth. of Nat.

Field Columbian Museum—Anthropol. Ser.
Folk-Lore
Fortn. Rev.
Fortsch. d. Med.
Forum
Friedreich's Bl. f. gerichtl. Med.

Gac. Med.
Gen. Corresp.
Gen. Meth.
Gen. Morphol.
Gesch. d. Aesthetik
Gesch. d. christl. Eth.
Gesch. d. Philos.
Gior. di Patol. Nerv. e Ment.
Glasgow Med. J.

Handb. d. Physiol.
Handb. of Mor. Philos.
Handwörterb. d. Staatswiss.
Hist. of Eth.
Hygeia

Inaug. Diss.
Inland Educ.
Int. J. of Ethics
Int. Med. Mag.
Int. Monatssch. f. Anat. u. Physiol.
Int. Sci. Ser.
Interméd. d. Biol. et d. Méd.
Interméd. d. Neurol. et d. Alién.
Iowa Med. J.

J. Amer. Folklore
J. Amer. Med. Assoc.
J. Anthropol. Inst.
J. Asiatic Soc.
J. Boston Soc. Med. Sci.
J. de l'Anat. et de la Physiol.
J. de Neurol. (et d'Hypnol.)
J. de Physiol. et Pathol. Gén.
J. de Physique
J. Int. d'Anat. et de Physiol.
J. Linn. Soc.
J. N. Y. Entomol. Soc.
J. N. Y. Microsc. Soc.
J. of Anat. and Physiol.
J. of Compar. Neurol.
J. of Educ.
J. of Exper. Med.
J. of Laryngol., Rhinol., and Otol.
J. of Ment. Sci.
J. of Morphol.
J. of Nerv. and Ment. Dis.
J. of Ophthal., Otol., and Laryngol.
J. of Orific. Surg.
J. of Pedag.
J. of Physiol.
J. of Polit. Econ.
J. of Specul. Philos.
Jahrb. f. Philos. u. spek. Theol.
Jahrb. f. Psychiat. u. Neurol.
Jena. Zeitsch. f. Naturwiss.
Johns Hopkins Hosp. Rep.
Johns Hopkins Univ. Circ.
J. Roy. Statist. Soc.

Kansas Univ. Quart.
Kantstud.
Klin. Monatsbl. f. Augenh.
Klin. Vortr. a. d. Geb. d. Otol. u. Phar.-Rhinol.
Krit. d. prakt. Vernunft
Krit. d. reinen Vernunft

La Nature
La Parole
Lancet
Laryngol.
Lects. on Met.
Lehrb. d. Psychol.
Linn. Soc. J. Zool.
Linn. Soc. Trans.
Lyon Méd.

Mag. Nat. Hist.
Manicomio Mod.
Manual of Psychol.
Med. Jahrb., Wien
Med.-Leg. J.
Med. Mag.
Méd. Mod.
Med. Record
Med. Times
Mem. Amer. Acad. Arts and Sci.

Mem. Amer. Mus. of Nat. Hist., N. Y.
Mem. Bost. Soc. Nat. Hist.
Mém. Soc. d'Anthropol. Paris
Mém. Soc. Zool. d. France
Ment. Devel. in the Child and the Race
Ment. Dis.
Meth. of Eth.
Mind
Mitteil. d. zool. Stat. zu Neapel
Monatssch. f. Ohrenh.
Monatssch. f. Psychiat. u. Neurol.
Monist
Mor. and Legisl.
Mor. Sent.
Morphol. Arb. (Schwalbe)
Morphol. Jahrb.
Münch. med. Wochensch.

Nat. Sci.
Nature
Natur u. Offenb.
Naturw. Wochensch.
Neurol. Centralbl.
New World
Nineteenth Cent.
Nordiskt Med. Arkiv.
Norsk Mag. f. Laegevid.
North Amer. Rev.
Northwest. Lancet
Nouv. Icon. de la Salpêtrière
Nov. Org.
Nuova Antol.
N. Y. Med. J.
N. Y. State Hosp. Bull.

Open Court
Ophthal. Rec.
Ophthal. Rev.

Päd. Monatsh.
Pedag. Sem.
Pediatrics
Philos. Aphor.
Philos. d. Griechen
Philos. Jahrb.
Philos. Mag.
Philos. of Educ.
Philos. Rev.
Philos. Stud.
Philos. Trans. Roy. Soc.
Philos. Zool.
Physical Rev.
Physiol. d. Geruchs
Physiol. Optik
Physiol. Psychol.
Polit. Sci. Quart.
Pop. Sci. Mo.
Pract. Eth.
Presb. and Ref. Rev.
Presse Méd.
Presse Méd. Belg.
Princeton Contrib. to Philos.
Princeton Contrib. to Psychol.
Princ. of Econ.
Princ. of Eth.
Princ. of Psychol.
Princ. of Sci.
Princ. of Sociol.
Proc. Acad. Nat. Sci.
Proc. Amer. Acad. Arts and Sci.
Proc. Amer. Assoc. Adv. Sci.
Proc. Amer. Med.-Psychol. Assoc.
Proc. Amer. Philos. Soc.
Proc. Amer. Psychol. Assoc.
Proc. Cambridge Philos. Soc.
Proc. Entomol. Soc.
Proc. Manchester Lit. and Philos. Soc.
Proc. Roy. Soc.
Proc. Soc. Psych. Res.
Proc. Zool. Soc.
Progrès Méd.
Przeglad Filoz.
Przeglad Lekarski
Psicol. Contemp.
Psychiater
Psychische Stud.
Psychol. als Wiss.
Psychol. Arb.
Psychol. Exper.
Psychol. Rev.
Publ. Amer. Acad. Polit. and Soc. Sci.

Quart. Med. J.
Quart. J. Microsc. Sci.
Quart. J. of Inebr.

Real-Encyc.
Rec. d'Ophthal.
Rendic. R. I. Lombard.
Rep. Brit. Assoc. Adv. Sci.
Rep. Bureau Ethnol.
Rep. Comm'r Educ.
Rep. Smithson. Inst.
Rev. Bleue
Rev. d. Deux Mondes
Rev. d. Quest. Hist.
Rev. d. Quest. Scient.
Rev. d. Rev.
Rev. de l'Enseignem.
Rev. de l'Hypnot.
Rev. de l'Univ. de Brux.
Rev. de Méd.
Rev. de Med. y Cirug. Pract.
Rev. de Mét. et de Mor.
Rev. de Mor. Sociale
Rev. de Paris
Rev. de Psychiat., de Neurol. et de Psychol. Expér.
Rev. de Psychol. Clin. et Thérap.
Rev. Encyc.
Rev. Gén. des Sci.
Rev. Gén. d'Ophthal.
Rev. Int. de l'Enseignem.
Rev. Int. de Sociol.
Rev. Méd. de la Suisse Romande
Rev. (Mens.) de l'École d'Anthropol.
Rev. Néo-Scol.
Rev. Neurol.
Rev. Pédag.
Rev. Philos.
Rev. Scient.
Rev. Thom.
Rev. Trimest. Microg.
Riv. di Filos. Scient.
Riv. di Patol. Nerv. e Ment.
Riv. di Sci. Biol.
Riv. Filos.
Riv. Icon. Policl. Gen. di Torino
Riv. Ital. di Filos.
Riv. Ital. di Sociol.
Riv. Mens. di Psich. Forens., Antropol. Crim., ecc.

Riv. Quind. di Psicol.
Riv. Sperim. di Freniat.

Science
Sci. of Educ.
Sci. Progress
Scient. Amer. Suppl.
Semaine Méd.
Semej. malat. ment.
Sitzber. Akad. Wiss. Berlin
Sitzber. Akad. Wiss. München
Sitzber. Akad. Wiss. Wien
Skand. Arch. f. Physiol.
Social and Eth. Interpret.
Sperimentale
Stud. in Educ.
Stud. Yale Psychol. Lab.
Syst. Dis. Eye
Syst. d. Philos.
System. Theol.

Texas Acad. of Sci.
Toledo Med. and Surg. Rep'r.
Trans. Amer. Microsc. Soc.
Trans. Amer. Philos. Soc.
Trans. Canad. Inst.
Trans. Illinois Soc. Child-Study
Trans. Roy. Soc. Canada
Trans. Roy. Soc. Edinburgh
Trib. Méd.
Tuke's Dict. of Psychol. Med.
Twentieth Cent. Pract. of Med.

Univl. Cyc.
Univ. Med. Mag.
Univ. of Cal. Stud.
Univ. of Chicago Contrib. to Philos.
Univ. of Iowa Stud. in Psychol.
Univ. of Toronto Stud.—Psychol. Ser.

Verh. d. Berl. Gesell. f. Anthropol.
Vocab. of Philos.
Voprosi Philos.
Vrach
Vtljsch. f. gerichtl. Med.
Vtljsch. f. Musikwiss.
Vtljsch. f. wiss. Philos.

Weekbl. v. h. nederl. Tijd. Geneesk.
West London Med. J.
West. Reserve Univ. Bull.
Westminster Rev.
Wien. klin. Rdschau.
Wien. klin. Wochensch.
Wien. med. Presse
Wien. med. Wochensch.
Wisc. Geol. and Nat. Hist. Survey Bull.
Wörterb. d. philos. Begriffe
Wörterb. d. philos. Grundbegriffe

Zeitsch. f. angew. Mikr.
Zeitsch. f. Augenh.
Zeitsch. f. Biol.
Zeitsch. f. Ethnol.
Zeitsch. f. Hypnot.
Zeitsch. f. imman. Philos.
Zeitsch. f. kathol. Theol.
Zeitsch. f. klin. Med.
Zeitsch. f. Krim.-Anthropol.
Zeitsch. f. Ohrenh.
Zeitsch. f. päd. Psychol.
Zeitsch. f. Philos. u. Päd.
Zeitsch. f. Philos. u. philos. Krit.
Zeitsch. f. physiol. Chemie
Zeitsch. f. Psychol.
Zeitsch. f. wiss. Zool.
Zool. Anz.
Zool. Jahrb.

L

(*continued*)

Leading of Proof: no concise foreign equivalents. The operation bringing up to attention, among propositions admitted to be true, certain relations between them which logically compel the acceptance of a conclusion. (C.S.P.)

Leading Principle: Ger. *leitendes Prinzip*; Fr. *principe directeur*; Ital. *principio fondamentale*. It is of the essence of reasoning that the reasoner should proceed, and should be conscious of proceeding, according to a general habit, or method, which he holds would either (according to the kind of reasoning) always lead to the truth, provided the premises were true; or, consistently adhered to, would eventually approximate indefinitely to the truth; or would be generally conducive to the ascertainment of truth, supposing there be any ascertainable truth. The effect of this habit or method could be stated in a proposition of which the antecedent should describe all possible premises upon which it could operate, while the consequent should describe how the conclusion to which it would lead would be determinately related to those premises. Such a proposition is called the 'leading principle' of the reasoning.

Two different reasoners might infer the same conclusion from the same premises; and yet their proceeding might be governed by habits which would be formulated in different, or even conflicting, leading principles. Only that man's reasoning would be good whose leading principle was true for all possible cases. It is not essential that the reasoner should have a distinct apprehension of the leading principle of the habit which governs his reasoning; it is sufficient that he should be conscious of proceeding according to a general method, and that he should hold that that method is generally apt to lead to the truth. He may even conceive himself to be following one leading principle when, in reality, he is following another, and may consequently blunder in his conclusion. From the effective leading principle, together with the premises, the propriety of accepting the conclusion in such sense as it is accepted follows necessarily in every case. Suppose that the leading principle involves two propositions, L and L', and suppose that there are three premises, P, P', P''; and let C signify the acceptance of the conclusion, as it is accepted, either as true, or as a legitimate approximation to the truth, or as an assumption conducive to the ascertainment of the truth. Then, from the five premises L, L', P, P', P'', the inference to C would be necessary; but it would not be so from L, L', P', P'' alone, for, if it were, P would not really act as a premise at all. From P' and P'' as the sole premises, C would follow, if the leading principle consisted of L, L', and P. Or from the four premises L', P, P', P'', the same conclusion would follow if L alone were the leading principle. What, then, could be the leading principle of the inference of C from all five propositions L, L', P, P', P'', taken as premises? It would be something already implied in those premises; and it might be almost any general proposition so implied. Leading principles are, therefore, of two classes; and any leading principle whose truth is implied in the premises of every inference which it governs is called a 'logical' (or, less appropriately, a *formal*) leading principle; while a leading principle whose truth is not implied in the premises

is called a 'factual' (or *material*) leading principle. (C.S.P.)

Least Squares (method of): see ERRORS OF OBSERVATION.

Left-handedness: see DEXTRALITY.

Legal [Lat. *legalis*]: Ger. *gesetzlich*; Fr. *légal*; Ital. *legale*. (1) Pertaining to law. (2) Conformable to law. (3) Pertaining to law, as distinguished from equity. (4) Defined or created by law, e. g. legal offences, legal disabilities.

Legal defence: one sufficient under the rules of law. *Legal ethics*: the ethical rules governing the conduct of the legal profession. That may be legal which is neither just nor honourable. 'Non omne quod licet honestum est,' *Dig.*, l. 17, *de diversis regulis iuris antiqui*, 144. (S.E.B.)

Legal Fiction: Ger. *Rechtsfiction*; Fr. *fiction légale*; Ital. *finzione legale*. The assumption, as a fact, of what is not known to be such, made by authority of law to promote justice.

It is generally done by the courts, sometimes by the legislature. Thus the English courts of common law, in order to take jurisdiction of matters of admiralty jurisdiction, anciently allowed a plaintiff to describe his cause of action as arising at Havre, to wit, in Westminster, and refused to allow the defendant to contest their right to entertain the case by denying the averment as to Westminster. Cf. Maine's *Ancient Law*, 26.

Legal fictions furnish the means by which most nations develop their system of procedure from formal into rational methods. See, as to their use in Roman law, Sohm's *Inst. of Roman Law*, § 38; Hadley's *Introd. to Roman Law*, 96. Wills causelessly disinheriting children could be set aside, 'hoc colore, quasi non sanae mentis fuerint cum testamenta ordinarent. Sed hoc dicitur non quasi vere furiosus sit, sed recte quidem fecerit testamentum, non autem ex officio pietatis. Nam si vere furiosus sit, nullum testamentum est' (*Inst. of Just.*, ii. 18, *de inofficioso testamento*). (S.E.B.)

Legend [Lat. *legere*, to read]: Ger. *Legende*; Fr. *légende*; Ital. *leggenda*. An edifying tradition which has grown up spontaneously and uncritically around some historical personage, and which, though lacking in historic verity, is valuable in the revelation it makes of the spirit and life of the people and time that produced it.

In ecclesiastical history: legend is the story of a saint or other religious personage which has grown up gradually in response to the requirements of religious edification, and which, though containing a nucleus of truth, is not historically reliable.

The legend differs from the myth in that it ordinarily develops about a real personage, whereas the myth may be pure fiction, and ordinarily arises out of a personification of some natural object or force. See MYTH.

Literature: EHRET, Allg. Gesch. d. Literatur d. Mittelalters im Abendlande (1874–87); MILMAN, Hist. of Latin Christianity; LECKY, Hist. of Rationalism in Europe. (A.T.O.)

Legislation [Lat. *lex*, law, + *latio*, a proposing]: Ger. *Gesetzgebung*; Fr. *législation*; Ital. *legislazione*. (1) The act of making a law, by a legislator or legislature. 'In legislation both the contents of the rule are devised, and legal force is given to it, by simultaneous acts of the sovereign power which produce "written law." All the other law sources produce what is called "unwritten law," to which the sovereign authority gives its whole legal force, but not its contents, which are derived from popular tendency, professional discussion, judicial ingenuity, or otherwise, as the case may be' (Holland, *Jurisprudence*, chap. v. 66). (2) The law made by a legislator or legislature.

Judicial legislation: the virtual making of law by judicial magistrates, by declaring in their judgments that to be law which had not previously been enacted or generally recognized as such. (S.E.B.)

Legitimate (in law) [Med. Lat. *legitimatus*]: Ger. *gesetzmässig, legitim*; Fr. *légitime*; Ital. *legittimo*. Accordant with law; having the support of law; legally entitled, especially of a child born in lawful wedlock (whether begotten in wedlock or not).

Legitimate portion: that share of a parent's estate which, by the rules of the civil law, cannot be willed away from the natural heir without some recognized legal justification. (S.E.B.)

Legitimation [Fr.]: Ger. *Legitimation*; Fr. *légitimation*; Ital. *legittimazione*. That by which an illegitimate child is made legitimate in law.

By English and American common law there is no method of legitimation. The later Roman law allowed it by virtue of a marriage of the parents at any time after the conception or the birth of the child (*Inst. of Just.*, iii. 1, 2). Similar laws have been enacted in many of the United States.

By English common law, legitimation has no extra-territorial force. Cf. Wharton, *Private Int. Law*, chap. v. (S.E.B.)

Leibnitz (or **Leibniz**), **Baron Gottfried Wilhelm von.** (1646–1716.) Born at Leipzig, where his father was professor of ethics, he was educated at Leipzig and Jena Universities. He received a doctorate in law, but had become deeply read in scholasticism and logic. For a period he had also studied Bacon, Hobbes, Kepler, Galilei, Gassendi, and, to some extent, Descartes; and was for a time converted to the mathematico-mechanical conception of nature. Under the patronage of Baron Boineburg he prepared for a political life, became assistant to Lasser in the preparation of a reformed code of Roman law, and member of the Court of Appeals in Mainz (1670). He visited London, met Newton, Boyle, and others, and became Fellow of the Royal Society. In Paris he was intimate with Cassini and Huyghens. In 1676 he accepted a position in the court of the Duke of Brunswick-Lüneburg, and (1678) was made counsellor and member of the supreme court. Called to Berlin in 1698 by Princess Sophia Charlotte, he established the Scientific Society, which has since become Berlin University.

Lemma [Gr. λῆμμα, gain, an assumption, premise]: Ger. *Hülfssatz, Lehnsatz*; Fr. *lemme*; Ital. *lemma*. A theorem which interrupts the course of development of a mathematical theory, but which is inserted to supply a premise for one of the theorems.

This use of the word seems to go back to Euclid, at least; and even Aristotle uses the word—not a common one with him—in connection with geometry, in the first chapter of the *Topics*. With Aristotle, however, it means a premise; and with the Stoics, more particularly, the major premise of a syllogism. (C.S.P.)

Lese-majesty [Fr.], also written 'lezemajesty': Ger. *Majestätsbeleidigung, Hochverrat*; Fr. *lèse-majesté*; Ital. *lesa maestà*. The crime of direct attack on the state, or on its sovereign, his family, or his chief officers of government.

Formerly in Europe this crime was also regarded as comprehending offences committed directly against God, such as sacrilege, blasphemy, or apostasy; being thus termed *lèse-majesté divine* (Merlin's *Répertoire de Jurisprudence*, sub verbo). Of *lèse-majesté humaine* there were several degrees, the offence being pushed so far in France as to include embezzlement by public officials and unlawful assemblies. The crime of High Treason (q. v.) was known by this name in England in the time of Glanvil (12th century). The Roman law named this offence *maiestatis crimen*, or more fully 'crimen laesae, imminutae, diminutae, minutae, maiestatis,' *Dig.*, xlviii. 4, *ad Legem Iuliam Maiestatis*; Smith's *Dict. of Greek and Roman Antiq.* (*maiestas*); Heineccius, *Antiq. Rom. Syntagma*, iv. § 46 f. (S.E.B.)

Lessing, Gotthold Ephraim. (1729–81.) Educated at the Fürstenschule in Meissen, and at Leipzig, in philology and theology. After 1748 he spent some time as journalist in Berlin. Went to Wittenberg (1752) to complete his studies; returned to Berlin (1753) to resume his work as journalist and critic. After two years spent in Leipzig, he returned once more (1758) to Berlin. In 1760 he became secretary to General von Tauenzien in Breslau, during the Seven Years' War; 1767, official playwright and artistic director of the Hamburg theatre; 1770, librarian of the ducal library at Wolfenbüttel.

Lewes, George Henry. (1817–78.) An English Positivist, born in London. In youth a business clerk, he began the study of medicine, but abandoned it for philosophy and psychology. Spent two years in Germany, returning to London in 1840, and devoting himself to literature. He was literary editor of *The Leader* (1849–54), and founded the *Fortnightly Review*.

Liability (in law) [Fr. *lier*, from Lat. *legare*, to bind]: Ger. *Haftbarkeit*; Fr. *responsabilité*; Ital. *risponsabilità*. Such a relation by one to another as will or may support an action by the latter against the former.

The maker of a note, as soon as it is delivered, comes under a liability to the holder, which may support an action, and will, if the note be dishonoured when due. The *contingent liability* of the endorser of a note becomes an *absolute liability* when the note is dishonoured, and due demand and notice follow. Liability is viewed by Austin 'as a sanction' imposed by law as a penalty for disobedience of law. But an unintentional act of violence to another may impose an actionable liability, though there was no intent to disobey the law. Liability for an act whereby another is injured can be rested better on the natural obligation to act in contemplation of the natural tendency, under existing circumstances known or knowable, of the act to do harm (see Holmes on the *Common Law*, 79, 81, 162).

Limited liability: (1) a liability of shareholders in a business corporation or joint-stock

company, limited by law to the amount of their subscriptions for shares; (2) the restricted liability of shipowners for accidents occurring without their fault (see *U. S. Revised Statutes*, § 832). *Individual liability*: that which one holding a representative position as executor, cashier, or governor, may incur by contracting on his personal credit, though not for his personal benefit. The common-law maxim is *Ubi ius, ibi remedium.* (S.E.B.)

Libelt, Karol. (1807–75.) Educated at Berlin, under Hegel, in philosophy. Wrote the gold medal essay on Spinoza (1828); received his doctorate in philosophy (1830). Took part in the Polish revolution in that year, and was imprisoned nine months. In 1840 he opened a private school at Posen, and edited two journals. His life was given to literature. He was again imprisoned (1846–8), and his journal suppressed (1849). Took a prominent part in the reorganization of Great Poland, and protested in the Parliament at Frankfort against the incorporation of Great Poland in Germany. He was the first famous Polish philosopher.

Liberalism [Lat. *liber*, free]: Ger. *Liberalismus*; Fr. *libéralisme*; Ital. *liberalismo.* (1) The personal disposition to free and untrammelled thought and action.

(2) The social sentiment which welcomes reforming and progressive opinion and action.

Liberalism is opposed to conservatism in both these meanings; but a certain relative balance between them is necessary to stable social organization, in which the writer (*Social and Eth. Interpret.*, chap. v. § 3; cf. Royce, *Psychol. Rev.*, v. 1898, 113) has likened them to habit and accommodation in the individual's life. Extreme liberalism, taking the form of a disposition to accept innovations as such, is called radicalism.

Literature: see Sociology, and Social Psychology. (J.M.B., F.H.G.)

Liberty (1) and (2) **Libertarianism** [Lat. *libertas*]: Ger. *Freiheit*; Fr. *liberté*; Ital. *libertà.* (1) See Freedom (various meanings), and Will; (2) Ethical Indeterminism (q. v.), also the references made under (1). (J.M.B.)

Liberty (political): see Freedom (political and social).

Liberty (religious): Ger. *Religionsfreiheit*; Fr. *liberté religieuse*; Ital. *libertà religiosa.* The legally secured right of the individual to hold and practise without interference any form of religious belief and worship he may choose, in so far as the exercise of his prerogative does not conflict with the fundamental political and social principles of the society to which he belongs.

The history of religious liberty in modern times begins with the edict of toleration by Constantine in 313 A. D. Throughout the middle ages the enforcement of conformity to prescribed forms of belief was regarded as a duty. The Reformation did not effect much advance in freedom, but Catholic and Protestant alike claimed the right of coercion. A considerable advance was made at the Peace of Westphalia in 1648, when equal rights were accorded to professors of the Catholic, Lutheran, and Calvinistic faiths. The French Revolution marked the beginning of a new era, in which the principle of religious freedom in its widest sense has gradually secured almost universal recognition.

Literature: Gibbon, Decline and Fall of the Roman Empire; Guizot, Hist. of Civilization in Europe; Voltaire, Essay on Toleration; Locke, Essays; Lecky, Hist. of Rationalism; Bancroft, Hist. of the United States. Cf. Erastianism, and Gallicanism. (R.M.W.)

Lie [AS. *leogan*]: Ger. *Lüge*; Fr. *mensonge*; Ital. *menzogna.* Any intentional deception of another by positive misrepresentation. Cf. Equivocation.

The essence of the lie rests in the intention to deceive; yet the means of the deception, by positive misrepresentation—as contrasted with either negative suggestion (*suggestio falsi*) or omission of truth (*suppressio veri*)—seems, though casuistical, to be well established. The following example from Macaulay (*Hist. of England*, chap. ix) illustrates this 'distinction without a difference.' Bishop Compton, who had invited William of Orange to invade England in 1688, is asked by King James if there is any truth in the statement in William's manifesto that some spiritual peers had invited him; he replies: 'Sir, I am quite confident that there is not one of my brethren who is not as guiltless as myself in this matter.' Macaulay remarks: 'The equivocation was ingenious; but whether the difference *between the sin of such an equivocation* and *the sin of a lie* be worth any expense of ingenuity may perhaps be doubted.'

The question of the ethical justification of a lie is also quite apart; whether right or not, a lie is a lie 'for a' that.' See Veracity, and cf. Casuistry. (J.M.B.–H.S.)

Life and **Organic** [AS. *hlifian*, Gr. ὄργανον]: Ger. *Leben, Lebewesen* (living being),

organisch; Fr. *vie, organique*; Ital. *vita, organico*. A form of organization found in certain material things, having the properties of self-perpetuation, for a longer or shorter time, and of reproduction in some form, and further distinguished by certain characters described as vital properties or properties of LIVING MATTER (q. v.). Matter having this organization and these characters is called 'living' or 'organic,' as opposed to 'dead' or 'inorganic' matter. Cf. also PROTOPLASM.

The theories of life have always turned on the form of organization displayed, as contrasted with other forms, such as notably the chemical. The problem seems little nearer solution now than in the time of the speculations of Aristotle. To Aristotle the soul was the 'form' or 'formal cause' of the organized body, the matter of which was the 'material cause' of the living creature. The scholastic theory of 'vitality' or 'vital force' postulated a principle additional to those of mechanical action and chemical organization, a view which laboured under the obscurity of the word 'force,' and came to be directly challenged when the generalization of the CONSERVATION OF ENERGY (q. v.) was announced. This difficulty, i. e. of determining whether vital phenomena are subject to the law of conservation, has never been overcome. The question is as to whether or not vital changes, such as those of development and growth, can be adequately accounted for as transformations of the known forms of energy; and if not, what more is necessary. Current views divide into (1) the mechanical or chemical, which holds that vital phenomena are entirely explainable in terms of mechanical and chemical change; (2) vitalism or neo-vitalism, holding to a 'something over,' which takes the form (*a*) of a new force or energy (e. g. growth-force or bathmism of Cope; 'genetic energy' of Williams), (*b*) a property of 'self-adaptation' (Henslow) or 'direction' (Eimer), or (*c*) the assumption of a form of 'so-called' directive force which, while diverting, guiding, or shunting physical energy, yet does not alter its amount. This last view often makes consciousness the new agent, and represents a distinct tendency in discussion to restate the question in terms of a dualism between matter and mind rather than between matter and life; the additional point being assumed, or directly advocated, that life and mind are coterminous. This does not alter the essential conditions of the problem, although it is held to strengthen the position of vitalism by making accessible to it the facts and arguments in support of some sort of causal activity of mind. Philosophically, however, it has the distinct advantage of reducing two dualisms to one, and of bringing the question within the lines of one of the broadest and most critical problems, i. e. that stated by Aristotle in terms of 'matter and form,' discussed by religious philosophers under the heading of teleology, and taking the form in modern metaphysics of the inquiry as to the final category of organization (matter and motion, dualism of body and mind, or monism in some higher term). Cf. MIND AND BODY, ORGANIZATION, TELEOLOGY, and the remarks on teleology under HEREDITY. The discussion labours under the confusions hidden in the words CAUSE, FORCE, ENERGY (which should also be consulted). Cf. also ORIGIN OF LIFE.

As to the explanation of the facts involved, the rival theory to vitalism is natural selection, which is at its best in explaining the apparently vital directive movement in evolution, but weaker in explaining individual growth and development. On the other hand, vitalism makes its strongest stand in what is called the developmental mechanics of the individual, where the facts of REGENERATION (q. v.) and organic accommodation, it is held, can only be described in vitalistic terms and illustrate the inscrutable mystery of life (cf. Wilson, *The Cell*, 329). It is interesting to note, as illustrating the truth of this opposition, that the new vitalism is current for the most part in countries—notably Germany and the United States—where the problems of ontogeny are especially investigated, while in other countries—notably England—vitalism in any form is criticized as mysticism.

Literature: ARISTOTLE, zoological writings; WUNDT, Logik, II. i. 3, 4, 'd. Logik d. Biol.'; COPE, Primary Factors of Organic Evolution; VERWORN, Gen. Physiol. (Eng. trans.); WILLIAMS, The Genetic Energy of Organisms, Science, May 27, 1898; SANDEMAN, The Problems of Biol.; EIMER, Organic Evolution (Eng. trans.); WILSON, The Cell; OSBORN, From the Greeks to Darwin; BROOKS, Foundations of Zool., v. BUNGE, Lehrb. d. Physiol. (1889); DU BOIS-REYMOND, Ueber d. Grenzen d. Naturerkenntniss; JAPP, Pres. Add. Chem. Sec. Brit. Assoc., Report, 1898; LLOYD-MORGAN, Monist, Jan., 1899; WARD, Naturalism and Agnosticism; and most of the general works on the BIOLOGICAL SCIENCES (q. v.). (J.M.B., C.LL.M.)

Life (spiritual) [ME. *lif*]: Ger. *geistiges Leben*; Fr. *la vie spirituelle*; Ital. *vita spirituale*. (1) That activity of a self-conscious being which gives rise to moral, aesthetic, and religious experiences.

(2) In theology: the divine life which is manifested in Christ, and in which the believer is by faith enabled to participate.

The spiritual life represents the central mystery of the Christian faith. The new birth involves the throwing away of the old carnal life and the putting on of a new life, of which the central principle is to be the spiritual energy of Jesus Christ. In the New Testament the spiritual life is not only represented as ideally rich and complete, but also as in its nature eternal as the life of God. (A.T.O.)

Light: see VISION.

Light of Nature [trans. of Lat. *lumen naturae* or *naturale*, a term used by Aquinas, *Summa Theologiae*, Pt. I, qu. 12, art. 13, and elsewhere. It is not necessary to suppose that he borrowed the term from the passage of Aristotle's *De Anima*, 430 a, 14, where the creative intellect is compared with light]: Ger. *natürliches Licht*; Fr. *lumière naturelle* (Pascal); Ital. *lume naturale* (Galileo). A natural power, or instinct, by which men are led to the truth about matters which concern them, in anticipation of experience or revelation. See LUMEN (also for literature).

The phrase is used in contradistinction to supernatural light. Tucker's *Light of Nature pursued* is a book written as a mild reaction against Locke and the Associationalists in the direction of the philosophy of common sense. (C.S.P.)

Light Sensation: Ger. *Lichtempfindung*; Fr. *sensation lumineuse*; Ital. *sensazione luminosa*. Visual sensation. See VISION. See also BRIGHTNESS. (E.B.T.)

Likeness or **Resemblance** (consciousness of) [AS. *lic*, in *gelic*, like]: Ger. *Aehnlichkeit*; Fr. *ressemblance*; Ital. *somiglianza*, or *rassomiglianza*. Two mental objects or contents are said to be alike for consciousness when in respect to certain features one might be taken for the other. This is hit off in the current conundrum: 'What is most like a rain-drop?' Answer: 'Another rain-drop.' Such objects are said to have likeness, to be alike, or to resemble each other.

Theories of likeness are based on partial identity of the two mental contents (cf. RESEMBLANCE); partial recognition of one in the other; partial assimilation of one to the other, or of both to a third; or on an active adjustment to one which holds also in part for the two. The last of these views, to which the writers adhere, is well summed up by Ward: 'Presented objects become related as "like" either in virtue of the active adjustment to a change of impression which their partial assimilation defeats, or in virtue of an anticipated continuance of the impression which this assimilation confirms' (art. Psychology, in *Encyc. Brit.*, 9th ed., XX. 180). Cf. the classification given under RESEMBLANCE, and the topics there referred to.

The case in which two things are alike in all respects—are taken one for the other—is mentioned under INDISCERNIBLES, and DIFFERENCE. (J.M.B.—G.F.S.)

Limen [Lat.]: equivalent to THRESHOLD (q. v.), which is already current, and is preferred.

The adjectives 'liminal' (at the threshold), 'subliminal' (below the threshold), and 'supraliminal' (above the threshold) are useful. Cf. LIMITS OF STIMULATION. (J.M.B.)

Limitative [Lat. *limitare*, to enclose]: Ger. *limitativ* (*Urtheil*); Fr. *limitatif*; Ital. *limitativo*. (1) Applied to a third quality of judgments, additional to affirmative and negative. The idea of such a third quality originated among the Romans from the difference between 'homo non est bonus' and 'homo est non bonus,' the latter being the limitative.

(2) Setting limits in the sense (2) given under LIMITING NOTION (q. v.).

It is one of the numerous cases in which accidents of language have affected accepted logical forms without any good reason. Boethius and others applied the infinitation to the subject also, which De Morgan has shown makes a valuable addition to logic. Wolff, however, limited the modification to the predicate, without showing any serious reason for such application. Kant adopted it because it rounded out his triad of categories of quality. His defence, as reported by Jäsche, is that the negative excludes the subject from the sphere of the predicate, while the unendliche, limitative, or infinite judgment puts it into the infinite sphere outside the predicate. It is to be remarked that Kant regards a positive mark as differing *per se* from a negative one, and, in particular, as having a far narrower extension. Like most of the old logicians, he virtually limited the universe of marks to such as arrest our attention. If that had been explicitly and

consistently done, it would have constituted an interesting particular logic, in which there would be a material and not merely formal difference between affirmative and negative facts. It is probable that Kant also understood the affirmative proposition to assert the existence of its subject, while the negative did not do so; so that 'Some phoenixes do not rise from their ashes' would be true, and 'All phoenixes do rise from their ashes' would be false. The limitative judgment would agree with the affirmative in this respect. This was probably his meaning, and he did not observe that his limitative judgment, 'The human soul is immortal (nichtsterblich),' may be construed as equivalent to the conjunctive judgment, 'The human soul is not mortal, and it is the human soul.' No doubt Kant would have seen a world of difference between these two assertions. In that case he should have adopted a fourth quality, 'The human soul is not immortal.' (C.S.P.)

Limiting Notion: Ger. *Grenzbegriff*; Fr. *notion-limite*; Ital. *concetto limite.* (1) A term used by Kant in a single passage of the *Krit. d. reinen Vernunft* (1st ed., 255) to signify that a NOUMENON (q. v., *ad fin.*), which is a thing in itself regarded as an object of reason, is something to which experience cannot attain, but is the inconceivable something behind the phenomena. The passage reads: 'Der Begriff eines Noumenon ist also bloss ein *Grenzbegriff*, um die Anmassung der Sinnlichkeit einzuschränken, und also nur von negativem Gebrauche.' (J.M.B.–C.S.P.)

(2) The notion of what would be the limiting or extreme case of the application of a truth or principle.

The limiting notion in this sense involves abstraction from the conditions of particular existence; and it also fulfils an ideal. Hence it is both limitative and negative with reference to existence in the sphere of the particular. Cf. LIMITATIVE (2), and LIMITS (in mathematics). The validity of Kant's negative conclusions regarding God, freedom, and immortality turns upon the construction of the negative character attributed to the limiting notion, i. e. upon the theory of reality of the noumenal or universal sort. (J.M.B.)

Limits (in mathematics) [Lat. *limes*, a boundary]: Ger. *Grenze*; Fr. *limite*; Ital. *limite.* A fixed quantity towards which we conceive or prove a variable quantity to approach, so that their difference becomes infinitesimal, though it never entirely disappears, is called a limit.

A simple example is that of the series $\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{1}{16}+$&c., in which each term is half the preceding one. It is evident that the sum of the terms will always be less than 1 by the last term, thus $\frac{1}{2}+\frac{1}{4}+\frac{1}{8}=1-\frac{1}{8}$, &c. Now since, by halving a quantity continually, we can make it less than any assignable quantity, it is clear that there is no limit to the possible smallness of the difference between the sum and 1. On the other hand, the sum can never become equal to 1, because we shall always have a difference equal to the last term of the series. In this case the value 1 is said to be the limit of the sum of the series. (S.N.)

Limits (of Stimulation (1) and (2) of Sensation): Ger. *Grenzwerthe*; Fr. *étendue*; Ital. *limine.* (1) The limits beyond which, in either direction, stimulation of a sense-organ is ineffective; (2) the boundaries of a sensation series or continuum. (E.B.T.)

In intensity: the extremes of intensity of stimulus that give sensations. The lower limit of sensation, the minimal sensation, the limen or THRESHOLD (q. v.), is the just noticeable intensity of sensation. The upper limit of sensation, or the maximal sensation, is that due to the most intense stimulus. The RANGE (q. v.) of sensation, according to Wundt, is measured by the maximal sensation divided by the threshold.

Wundt introduced the term Reizhöhe for the upper limit. The existence of the lower limit is in part due to the interference of physical and physiological stimuli, in part to physiological inertia and dispersion, and in part may perhaps be regarded as a case of subconscious stimulation. The upper limit is perhaps due to the injury of the sense-organ by intense stimulation. Cf. FECHNER'S LAW, WEBER'S LAW, and PSYCHOPHYSICAL METHODS. (J.McK.C.)

In quality, &c.: the term 'limits of stimulation,' with its correlate 'range of stimulation,' applies also to sensation qualities. We may determine qualitative limits in two different ways. The upper and lower limit of tone stimulation, e. g., may be given as the greatest and least number of vibrations in the second that produce a tone sensation (see Auditory Sensation under HEARING). Or we may inquire as to the least number of vibrations necessary for the cognition of a tone of given vibration rate: this number seems to vary between 2 and 20. Moreover, every sense-organ shows limits with respect to the time intervals of stimulation, while the eye

and skin have also limits with respect to extent.

Literature: KÜLPE, Outlines of Psychol., 34; WUNDT, Physiol. Psychol. (4th ed.), i. 334 f. (E.B.T.)

Lindner, Otto. (1820–67.) Born and educated at Breslau, he devoted himself especially to philology and philosophy. He became a private instructor in Berlin, and in 1847 took a position on the *Vossische Zeitung*, becoming editor-in-chief in 1863.

Line of Beauty: Ger. *Schönheitslinie*; Fr. *ligne de beauté*; Ital. *linea di bellezza.* A term applied by Hogarth (1745) to a serpentine line, which he regarded as the most beautiful outline.

In his *Analysis of Beauty* (1753) Hogarth styled the serpentine line 'line of grace' (see GRACE), and restricted the term 'line of beauty' to the waving line (∽). He regarded 'variety' as the ground of its aesthetic value. (J.H.T.)

Line of Direction: Ger. *Richtungslinie* (*-strahl*); Fr. *ligne de direction*; Ital. *linea di direzione.* The line of direction is the straight line connecting a luminous point with the nodal point of the 'reduced' eye, and prolonged to meet the retina. It gives the position on the retina of the luminous point. See Fig. 7 under VISION.

Literature: HELMHOLTZ, Physiol. Optik (2nd ed.), 91, 742; WUNDT, Physiol. Psychol. (4th ed.), ii. 98; SANFORD, Course in Exper. Psychol., expts. 106, 117; AUBERT, Physiol. Optik, 600; FICK, in Hermann's Handb. d. Physiol., III. i. 64; HERING, ibid., 349; Beitr. z. Physiol., i. (1861) 25 ff. Cf. LINE OF VISION. (E.B.T.)

Line of Regard: Ger. *Blicklinie*; Fr. *ligne de regard* (Helmholtz, *Physiol. Optik*, Fr. trans., 599); Ital. *linea di mira.* The straight line connecting the point of regard or fixation point with the centre of rotation of the eye. See Fig. 7 under VISION.

Literature: HELMHOLTZ, Physiol. Optik (2nd ed.), 91, 617, 679; SANFORD, Course in Exper. Psychol., 119, and expts. 176, 177, 219; WUNDT, Physiol. Psychol. (4th ed.), ii. 99, 121; AUBERT, Physiol. Optik, 419, 646; HERING, in Hermann's Handb. d. Physiol., III. i. 441. See LINE OF VISION. (E.B.T.)

Line of Vision or **Line of Sight:** Ger. *Gesichtslinie*; Fr. *rayon visuel*; Ital. *linea visuale.* A straight line joining the fovea with the fixation point, and making with the OPTICAL AXIS (q.v.) an angle of about five degrees. The line may also be defined in terms of the nodal point of the 'reduced' eye, and accordingly termed the 'principal ray of direction.' It is practically coincident with the LINE OF REGARD (q.v.; see also Fig. 7 under VISION).

Literature: WALLER, Human Physiol., 412; HELMHOLTZ, Physiol. Optik (2nd ed.), 91, 617; WUNDT, Physiol. Psychol. (4th ed.), ii. 99, 121; AUBERT, Physiol. Optik, 415, 417; FICK, in Hermann's Handb. d. Physiol., III. i. 59; HERING, ibid., 349. (E.B.T.)

Linguistic Science: see PHILOLOGY, LANGUAGE, and PHONETICS.

Listing's Law: Ger. *Listing'sches Gesetz der Augenbewegungen*; Fr. *loi de Listing pour les mouvements de l'œil*; Ital. *legge di Listing.* 'If the LINE OF REGARD (q.v.) is carried from the primary to any other position, the torsion of the eyeball in this new position is as it would be if the eye had turned about a fixed axis, standing at right angles to both directions of the line of regard' (Helmholtz).

The law has two corollaries: (1) that in movements from the primary position there will not be, and (2) that in movements from secondary position to secondary position there will be, rotation about the line of regard. Cf. Sanford, *Course in Exper. Psychol.*, expt. 131 b, and App. I.

Literature: HELMHOLTZ, Physiol. Optik (2nd ed.), 623; WUNDT, Physiol. Psychol. (4th ed.), ii. 116; SANFORD, Course in Exper. Psychol., expt. 131 b; AUBERT, Physiol. Optik, 646, 653; LE CONTE, Sight, 147; HERING, Binocul. Sehen (1868), 64, 68; RUETE, Lehrb. d. Ophthal., i. 37. (E.B.T.)

Littré, Maximilien Paul Emile. (1801–81.) Born and educated for medicine in Paris. In 1830 he fought on the barricades in Paris as a republican. Shortly after this he began writing scientific articles for *Le National.* In 1839 he became a member of the Académie des Inscriptions et Belles-Lettres. In 1840 he read the works of Auguste Comte and became a leader among the advocates of the Positive philosophy. He took up the *Histoire littéraire de la France* upon the death of Fauriel in 1844. In 1863 he presented the Academy with the first part of his *Dictionnaire de la Langue Française*; he continued also his contributions to medical literature. Member of the Assembly in 1871, and life senator after 1875. Member of the Académie Française after 1874.

Living Matter: Ger. *lebendiger Stoff*; Fr. *substance vivante*; Ital. *sostanza* (or *materia*) *vivente.* Matter in the peculiar un-

stable or labile condition which enables it to manifest the properties or functions of life. These properties are (1) nutrition in its widest sense, as including all the processes of anabolism and katabolism. (2) Reproduction: the power of changing dead (food) matter into itself, thus reproducing itself and increasing in amount up to the limit of the food supply. All known living matter has thus arisen from previous living matter. (3) Irritability, including the fundamental functions of conductivity and contractility: the property of living matter by which it is enabled to respond to stimuli, i. e. to maintain continuously internal adjustments to external changes, an essential characteristic of life. (C.F.H.)

Chemical Composition. Protoplasm is not a unitary chemical substance, but it is a complex mixture in ever-varying proportions of very many different substances. The quest for a definite chemical formula for protoplasm has proved vain. Living substance can at present be defined, not in terms of chemical composition, but in terms of its morphological and physiological properties. The nature of the bond which holds these diverse substances together and maintains the integrity and continuity of the life process during the continual flux of the elements of its physical basis, which, in short, renders living substance self-perpetuating—this is the problem of life, and it is apparently as far from solution to-day as it was in the time of our fathers, who cloaked their ignorance under the term 'vitalism.' Cf. LIFE.

Vital manifestations, however, so far as they have yet been analysed, reduce themselves to physico-chemical forces, from which it may be inferred that the distinguishing features of living things depend upon the nature of the interrelation of these forces rather than upon any special super-physical force. But it does not at all follow that the synthesis of living substance would be possible, even if we were able to make artificially all the proximate chemical compounds which are mingled in its structure. For, as Oscar Hertwig has pointed out, none of the protoplasm now living has been formed in any other way than by the propagation of pre-existing protoplasm; it is, therefore, the product of an exceedingly long historical development.

At present, however, our knowledge of the molecular structure of the proximate ingredients of protoplasm is very meagre. The simplest of these organic compounds have very large molecules, often with more than a thousand atoms. The formula for a molecule of albumen has been given as $C_{72}H_{106}N_{18}SO_{22}$, and for haemoglobin, $C_{600}H_{960}N_{154}Fe_1S_3O_{179}$. This peculiarity alone is sufficient to explain many of the properties of organic substances, such as their inability in most cases to dialyze and to diffuse rapidly in solutions. For some interesting speculations growing out of the properties of the twelve elements chiefly represented in organized bodies (viz. C, N, S, H, O, P, Cl, K, Na, Mg, Ca, Fe), see Spencer's *Principles of Biology* and Verworn's *General Physiology.* The latter author gives a brief account of Pflüger's interesting researches on the rôle of cyanogen, CN, in the metabolism of proteids, from which the conclusion is drawn that the essential difference between living and dead proteid is the presence of the radical cyanogen in the former, but not in the latter. Further study of the properties of some of the non-living compounds of this radical brings out some curious resemblances with living proteid (notably in their tendency towards transformation and polymerization), and Pflüger concludes: 'Accordingly, I should say that the first proteid to arise was living matter, endowed in all its radicals with the property of vigorously attracting similar constituents, adding them chemically to its molecule, and thus growing *ad infinitum.* According to this idea, living proteid does not need to have a constant molecular weight; it is a huge molecule, undergoing constant, never-ending formation and constant decomposition, and probably behaves towards the usual chemical molecules as the sun behaves towards small meteors.'

Another, and perhaps the simplest, method of considering the problem of living matter, though it suffers, as do all others, from the impossibility of concrete demonstration, concerns itself not with the analysis of the material elements of living substance into units whose quantitative formulas somehow are supposed to represent the potency of the substance, but with a synthesis of the several energies after the analogy of the composition of forces in mechanics. This theory does not suppose that the several grades of vitalized matter differ in ways that can be expressed by chemical formulas, but the forces merged into the living entity are conceived of as constituting a unitary force compounded from the more elementary ones, merged in it in such a way that, if our knowledge were complete enough, the several vital activities might be

expressed somewhat as are the complex curves of geometry. The essential point of this theory lies in its insistence that the vital activity is a unit and not a compound thing. A method of dynamic notation is greatly needed in this connection.

Microscopic Structure. Casual examination of protoplasm, even with rather low magnifying powers, shows that it is by no means homogeneous; and the more thorough the examination, the more forcibly is this differentiation impressed upon the observer. When properly prepared by suitable reagents it is seen to be composed of a more fluid portion or plasma (cytolymph, enchylema, or ground-substance), and a more dense material, the spongioplasm. The latter must not, however, be regarded as normally a solid, for living substance as a whole is unquestionably liquid.

The theories of protoplasmic structure fall into two general classes: those which regard the more fluid plasma as the essential vital part, and those which regard the more dense framework as the essential, the interstitial substance serving simply as a vehicle for nutrition, &c. Though the former of these views is supported by several eminent authorities, yet the great majority of observers hold to the latter conception in some form, or regard both ingredients as equally essential. But these observers are by no means agreed as to the nature of the spongioplasm. We have, accordingly, from this point of view, four theories of protoplasmic structure:—

I. The granular theory. The microscope does unquestionably reveal the presence of numerous granules both in living and in prepared protoplasm, and they have given rise to much speculation. They have been variously termed micellae, pangens, ideoblasts, ideosomes, plastidules, bioplasts, gemmae, biogens, biosomes, microsomes, &c. The latter term is perhaps the most unobjectionable, as involving less of hypothetical interpretation. Many authors regard these bodies as a sort of biological unit of lower order than the cell. The existence of such units was postulated from theoretical grounds by several of the earlier authors (Spencer's 'physiological units,' Nägeli's 'micellae,' Darwin's 'gemmules,' &c.), and they figure very largely in the writings of several recent authors (notably Weismann and Altmann).

II. The filar theory. According to this conception, usually ascribed to Flemming, the spongioplasm is composed of interlacing threads which do not unite to form a reticulum.

III. The reticular theory. The structure is conceived of as a mass of threads which are combined into a more or less regular network. This reticular appearance is very often observed, though it is not always possible to prove that the fibres actually anastomose. The microsomes are often seen in connection with it, either at the nodes of the reticulum or strung along the fibres. Probably the majority of competent observers, at least until very recently, have held to this view.

IV. The alveolar theory. This we owe primarily to Bütschli, whose researches upon artificial foams lend some support to the belief that protoplasm is a microscopic foam or emulsion of two liquids of different densities. The fibres of the other theories are the walls of the vesicles of this emulsion as seen in optical section. This idea is being adopted, wholly or partially, by a rapidly increasing number of both zoologists and botanists, particularly those of the younger generation.

Probably no one of these conceptions expresses the whole truth. Indeed, Wilson has very recently brought forth strong direct evidence that the alveolar spheres, microsomes, and some, at least, of the true thread structures of the cytoplasm, are all different gradations of one structure. He agrees with Kölliker that 'no universal or even general formula for protoplasmic structure can be given,' and adds: 'Life in its full sense is the property of the cell-system as a whole rather than of any one of its separate elements. Nevertheless, we are perhaps justified in maintaining that the continuous substance is the most constant and active element, and that which forms the fundamental basis of the system, transforming itself into granules, drops, fibrillae, or networks in accordance with varying physiological needs.'

Properties. Since the dawn of science, there has been a strong tendency towards mysticism in the treatment of all phenomena connected with life. Of the commonly enumerated fundamental physiological properties (spontaneity, irritability, contractility, growth, reproduction, &c.), all, except possibly the last, when rigidly defined, can be shown to be manifested in some degree under proper conditions by dead substances. The specific living substance contains no elements not found in unorganized matter, though, as we have seen, these elements are probably arranged in a characteristic manner. If we follow

Verworn and say that 'the life-process consists in the metabolism of proteids,' it is plain that there is no room here for any metaphysical agency, since metabolism is merely the sum of the chemical processes going on within the body.

The present tendency is to study the properties of living beings in the same way as we do the properties of other physical bodies, viz. experimentally. This, of course, has always been the method of physiology, but of late it has been widely extended into the fields of experimental morphology and experimental embryology, in the hope of determining, not only what the phenomena of these sciences are, but how they came to be so. Since all vital manifestations can probably be reduced to responses of the living material to the forces impinging upon it from the environment, this study resolves itself into two problems, viz. the intrinsic properties of the reacting substance as such, and the specific effects of outer forces upon this substance.

The former problem includes the study of the protoplasmic constants, such as general chemical properties, physical structure, heredity, &c., and is far less advanced than the latter. Since in nature these two factors are always represented in every vital phenomenon, for scientific purposes they must be artificially separated, either by logical analysis or actually, under experimental conditions. Hence the motive for the present tendency towards experimental biology. It must be admitted that this analysis has not yet been carried very far. Even HEREDITY (q. v.), the name given to the self-perpetuation of vital processes from generation to generation, is not rigidly true to type, i. e. variations occur, whose connection with external conditions cannot always be traced, and the embryologists are divided into opposing schools on the question of the relative importance to the course of the ontogeny of intrinsic, i. e. inherited, factors and those which are extrinsic, i. e. determined by the direct action of the environment. This is the modern phase of the old controversy between PREFORMATION and EPIGENESIS (see those terms, and cf. Wilson, *The Cell in Development and Inheritance*, particularly the last chapter).

All the phenomena of growth, however much they may be dependent upon inherent structure, are also affected variously by environmental influences. For instance, the necessity for the division of a growing body into units (cells) of small size is due simply to the fact that during growth the absorbing surface, by which alone nutriment can enter the protoplasm, increases as the square of the radius, while the protoplasmic mass, in which the consumption of nutriment takes place, increases as the cube of the radius. Obviously a limit is soon reached beyond which nutriment cannot be absorbed as fast as it is consumed, and either growth must cease or the mass must be divided so as to permit an increase of surface without a corresponding increase of mass. One of the most striking cases of the influence of external forces upon the course of development has been recently brought out by Loeb, who finds that unfertilized eggs of sea-urchins, if put into water containing a definite proportion of magnesium chloride for a short time and then transferred to ordinary sea water, will develop into normal larvae without previous fertilization. See PARTHENOGENESIS (artificial).

Again, observation shows that different organisms are adapted to very diverse environmental conditions, so that what is favourable to one may be fatal to another. This presumably rests upon a difference in the structural organization of the protoplasm. But experiment teaches us that an animal or plant may, by gradually changing the external conditions of life, be acclimated or accommodated to an environment which would have been fatal to it before. This change in the conditions of life may be brought about in a race by natural selection, or it may be produced in an individual by the direct influence of the environment upon the living matter. Davenport explains the latter case by the assumption of a specific kind of molecule in the protoplasm which is capable of responding to a certain stimulus. The repeated application of this stimulus might destroy these molecules faster than they could be replaced, and in consequence the organism would in the end be unable to respond to this particular stimulus. If the stimulus is an injurious one, the organism would no longer be injured by it. This hypothesis would explain, not only acclimatization, but also immunity after innoculations, &c.

Many attempts have been made to localize the various vital processes within the cell. Thus, the chromatin of the nucleus is regarded by many as the specific bearer of heredity. It is, however, impossible wholly to exclude the participation of the cytoplasm in the process of fertilization. The nucleus, more-

over, is sometimes spoken of as the source of the chemical energy of the cell, though it is more correctly described as the centre of the metabolic activities of the cell. The nucleus is sometimes seen to migrate in a large cell to the point of most active growth, and in other cases is enlarged and curiously modified in correlation with special metabolic functions of its cell. It is well known that non-nucleated bits of protoplasm, while they may ingest and partially digest food, are incapable of assimilating it, and hence soon perish. On the other hand, experiments show that the nucleus is also incapable of prolonged life without the cytoplasm. It has also been shown that, though nucleated bits of protoplasm are in many different organisms capable of regenerating the whole body, nevertheless there is a limit of size (which differs in different animals) below which such regeneration cannot occur, on account of deficient organization, even though all the other conditions seem to be fulfilled. Thus, Lillie found that a nucleated fragment of the protozoan Stentor could regenerate the whole body, provided it contained at least one twenty-seventh of the mass of the normal Stentor, but not if smaller than this.

The reactions of organisms to external stimuli are reduced in last analysis to reactions of their individual cells; they can therefore best be studied in the unicellular animals and plants, since here each cell can express its proper reaction by free movement. Accordingly, we have an extensive series of researches upon the reactions of such cells to external stimuli, giving us the following types of simple responsive movements: (1) chemotaxis, response to chemical stimuli; (2) phototaxis (heliotropism), response to luminous stimuli; (3) thermotaxis, response to thermal stimuli; (4) hydrotaxis, movements towards or from moisture; (5) barotaxis, movements determined by pressure, and including (*a*) thigmotaxis (stereotaxis), movements towards or from a solid object; (*b*) rheotaxis, movements with reference to the direction of flow of a current of liquid; (*c*) geotaxis, movements with reference to the direction of gravity; (6) tonotaxis, movements with reference to the density of the medium; (7) galvanotaxis (electrotaxis), movements with reference to electrical stimuli.

It is to be noted that these simple reactions, which are common to animals and plants, include nearly all (and perhaps quite all) the elements of the simpler reflexes of higher animals. These reflexes, therefore, as Loeb has so forcibly argued, are not to be regarded as functions of nerve cells only, but rather of protoplasm as such.

The preceding reactions may all be described as 'directive effects of unilateral stimulation' (Verworn). Of course, they are not confined to unicellular organisms, for free cells within the bodies of higher animals (leucocytes, sperm cells, &c.) undoubtedly obey these laws; so also many of the movements of the bodies and organs of these animals, such as the various tropisms recognized in physiology. Even when free movement of the reacting cells is prevented by the adjacent tissues, the forces underlying chemotaxis, &c., undoubtedly govern intra-cellular life to a large extent. This is best illustrated by the selection of food. Thus, each of the various types of cells of the body, all of which are bathed in a common nutrient fluid—the body lymph—selects the materials of which it has need, and no others.

The ultimate explanation of all these reactions is, naturally, to be sought in internal organization. The importance of the latter factor is also shown by the fact that the same reaction often follows from very diverse stimuli. For instance, muscular contraction can be evoked by chemical, mechanical, thermal, or electrical stimulation. In other words, the organization of contractile substance is such that if its vital equilibrium is disturbed by any cause whatever, its energy is discharged in a single mode. It follows that any living tissue which has any considerable structural differentiation possesses a certain SPECIFIC ENERGY (q. v.), though just how far the 'specific energy' of any given organ (notably among the sense organs, where the term was first applied) is due to internal cellular organization of the primary reacting cells, and how far to differences in the connections of these cells with other cells, is still an open question.

Literature: Chemical composition: BUNGE, Lehrb. d. physiol. u. pathol. Chemie (3rd ed., Leipzig, 1894); GAMGEE, Physiological Chemistry of the Animal Body (London, 1880); KOSSEL, Ueber die chemische Zusammensetzung der Zelle, Arch. f. Anat. u. Physiol., Physiol. Abth. (1891); LEA, Chemical Basis of the Animal Body, Appendix to Foster's Physiol. (6th ed.); MALFATTI, Zur Chemie des Zellkerns, Ber. d. naturw.-med. Vereins zu Innsbruck, xx (1891–2); NEUMEISTER, Lehrb. d. physiol. Chemie (2nd ed., Jena, 1897); PFLÜGER, Ueber die physiologische Verbren-

nung in den lebendigen Organismen, Arch. f. d. ges. Physiol., x (1875); Reinke and Rodewald, Stud. ü. das Protoplasma (Berlin, 1881); Schwarz, Die morphologische und chemische Zusammensetzung des Protoplasmas, Beitr. z. Biol. d. Pflanzen, v (Breslau, 1887); Zinoffsky, Ueber die Grösse des Hämoglobinmolecüls, Zeitsch. f. physiol. Chemie, x (1885); Loew, Die chemische Energie der lebenden Zellen (Munich, 1899); The Proteids of Living Matter, Science, N.S., xi (1900).

Microscopic structure: R. Altmann, Die Elementarorganismen u. ihre Beziehungen zu den Zellen (2nd ed., Leipzig, 1894); G. F. Andrews, The Living Substance as such and as Organism, J. of Morphol., xii. No. 2, suppl. (1897); Th. Boveri, Zellenstudien, Jena. Zeitsch. f. Naturwiss., N. F., xiv (1887), xv (1888), xvii (1890); O. Bütschli, Untersuch. ü. mikr. Schäume u. das Protoplasma (Leipzig, 1892; Eng. trans. with extensive bibliog., London, 1894); J. B. Carnoy, A series of articles in La Cellule, i. ff.; Y. Delage, La Structure du Protoplasma et les Théories sur l'Hérédité (Paris, 1895); T. W. Engelmann, Zur Anatomie und Physiologie der Flimmerzellen, Arch. f. d. ges. Physiol., xxiii (1880); R. v. Erlanger, Neuere Ansichten über die Struktur des Protoplasmas, Zool. Centralbl., iii (1896); W. Flemming, Zellsubstanz, Kern u. Zelltheilung (Leipzig, 1882); Neue Beiträge zur Kenntniss der Zelle, ii. Theil, Arch. f. mikr. Anat., xxxvii (1891); M. Heidenhain, Ueber Kern und Protoplasma, Festschr. f. Kölliker (1893); L. F. Henneguy, Leçons sur la Cellule (Paris, 1896); O. Hertwig, Die Zelle und die Gewebe (Jena, 1892; Eng. trans., The Cell, Outlines of General Anat. and Physiol., London and New York, 1895); C. Nägeli, Mechanisch-physiol. Theorie der Abstammungslehre (Munich and Leipzig, 1884); E. A. Schäfer, On the Structure of Amoeb. Protoplasm, Proc. Roy. Soc. (London, 1891); E. Strasburger, Zellbildung und Zellteilung (3rd ed., Jena, 1880); Stud. ü. das Protoplasma, Jena. Zeitsch. f. Naturwiss., x (1876); W. Waldeyer, Die neueren Ansichten über den Bau und das Wesen der Zelle, Deutsch. med. Wochensch. (1895); A. Weismann, Essays upon Heredity and kindred Biol. Problems (trans. from the German; 2 vols., Oxford, 1892); The Germ-Plasm, a Theory of Heredity (trans., New York, 1893); J. Wiesner, Die Elementarstruktur u. das Wachstum d. lebenden Substanz (Vienna, 1892); E. B. Wilson, The Cell in Devel. and Inheritance (New York and London, 1898); The Structure of Protoplasm, in Biol. Lects. delivered at the Marine Biol. Lab. 1898–9 (Boston, 1899), also in Science, N.S., x, July 14, 1899; A. Zimmermann, Die Morphologie und Physiologie des pflanzlichen Zellkernes, eine krit. Litteraturstudie (Jena, 1896).

Properties: Berthelot, Fixation directe de l'Azote atmosphérique libre par certains Terrains argileux, C. R. Acad. d. Sci., ci (1885), cxv (1892), cxvi (1893); A. Binet, The Psychic Life of Micro-organisms (authorized trans., Chicago, 1890); G. Born, Ueber Verwachsungsversuche mit Amphibienlarven, Arch. f. Entwicklungsmech., iv (1896); H. Buchner, Die chemische Reizbarkeit der Leukocyten, &c., Sitzber. d. Ges. f. Morphol. u. Physiol. z. München, vi (1891); C. B. Davenport, A Preliminary Catalogue of the Processes concerned in Ontogeny, Bull. Mus. Compar. Zool., xxvii. 6 (1895); Exper. Morphol., Pt. I (New York and London, 1897), Pt. II (1899; contains extensive classified bibliographies); Davenport and Castle, On the Acclimatization of Organisms to High Temperatures, Arch. f. Entwicklungsmech., ii. 2 (1895); Davenport and Neal, On the Acclimatization of Organisms to Poisonous Chemical Substances, Arch. f. Entwicklungsmech., ii. 4 (1896); R. Dubois, Sur la Perception des Radiations lumineuses par le Peau, chez les Protées aveugles des Grottes de la Carniole, C. R. Acad. d. Sci., cx (1890); H. Driesch, Heliotropismus bei Hydroïdenpolypen, Zool. Jahrb., System. Abth., v (1890); Entwicklungsmech. Stud., i–vi, Zeitsch. f. wiss. Zool. (1891–3); Analytische Theorie d. organischen Entwicklung (Leipzig, 1894); Stud. ü. das Regulationsvermögen d. Organismen, Arch. f. Entwicklungsmech., v (1897); Th. Eimer, Die Entstehung der Arten auf Grund von Vererben erworb. Eigenschaften (Jena, 1888; Eng. trans., London, 1890); T. W. Engelmann, Über Licht- und Farbenperception niederster Organismen, Arch. f. d. ges. Physiol., xxix (1882); Bacterium photometricum, ein Beitrag zur vergleichenden Physiologie des Licht- und Farbensinns, Arch. f. d. ges. Physiol., xxx (1883); Ueber Bewegungen der Zapfen und Pigmentzellen der Netzhaut, &c., Arch. f. d. ges. Physiol., xxxv (1885); R. v. Erlanger, Die neuesten Ansichten ü. die Zelltheilung und ihre Mechanik, Zool. Centralbl., iii (1896); L. Errara, On the Cause of Physiological Action at a Distance, Rep. Brit. Assoc.

Adv. Sci. (1892); C. W. Hargitt, Experimental Studies upon Hydromedusae, Biol. Bull., i. 1 (1899); M. Heidenhain, Cytomechanische Studien, Arch. f. Entwicklungsmech., i. 4 (1895); C. Herbst, Ueber die Bedeutung der Reizphysiologie für die kausale Auffassung von Vorgängen in der tierischen Ontogenese, Biol. Centralbl., xiv–xv (1894–5); Ueber die zur Entwickelung der Seeigellarven nothwend. anorg. Stoffe, i. Theil, Arch. f. Entwicklungsmech., v (1897); O. Hertwig, Ueber den Einfluss der Temperatur auf die Entwick., Arch. f. mikr. Anat., li (1898); W. E. Garrey, The Effects of Ions upon the Aggregation of Flagellated Infusoria, Amer. J. of Physiol., iii (1900); W. His, Unsere Körperform und das physiologische Problem ihrer Entstehung (Leipzig, 1874); Ueber mechanische Grundvorgänge thierischer Formenbildung, Arch. f. Anat. u. Physiol., Anat. Abth. (1894); H. S. Jennings, The Psychology of a Protozoon, Amer. J. of Psychol., x. 4 (1899); The Behaviour of Unicellular Organisms, Woods Holl Biol. Lects. for 1899 (Boston); Studies on Reactions to Stimuli in Unicellular Organisms—I. Reactions to Chemical, Osmotic, and Mechanical Stimuli in the Ciliate Infusoria, J. of Physiol., xxi (1897); II. The Mechanism of the Motor Reactions of Paramecium, Amer. J. of Physiol., ii (1899); III. Reactions to Localized Stimuli in Spirostomum and Stentor, Amer. Natural., xxxiii (1899); IV. Laws of Chemotaxis in Paramecium, Amer. J. of Physiol., ii (1899); V. On the Movements and Motor Reflexes of the Flagellata and Ciliata, Amer. J. of Physiol., iii (1900);—Reactions of Infusoria to Chemicals, a Criticism, Amer. Natural., xxxiv (1900); P. Jensen, Ueber den Geotropismus niederer Organismen, Arch. f. d. ges. Physiol., liii (1893); E. Korschelt, Beiträge zur Morphologie und Physiologie des Zellkerns, Zool. Jahrb., Abth. f. Anat., iv (1889); F. E. Lillie, On the Smallest Parts of Stentor capable of Regeneration, a Contribution on the Limits of Divisibility of Living Matter, J. of Morphol., xii. 1 (1896); J. Loeb, Einleitung in die vergleichende Gehirnphysiologie und vergleichende Psychologie, &c. (Leipzig, 1899; Eng. trans., 1900); On the Artificial Production of Normal Larvae (Arbacia), Amer. J. of Physiol., iii. 9 (1900), and Science, N.S., xi. No. 277 (1900); O. Loew, Ein natürliches System der Gift-Wirkungen (Munich, 1893); The Energy of the Living Substance (London, 1896); E. Mach, Beiträge zur Analyse der Empfindungen (Jena, 1886); Die Principien der Wärmelehre (Leipzig, 1896); J. Massart, La Sensibilité à Concentration chez les Êtres unicellulaires marins, Bull. Acad. Roy. Belg. (3) xxii (1891); Sur l'Irritabilité des Noctiluques, Bull. Sci. France et Belg., xxv (1893); E. Maupas, Sur la Puissance de Multiplication des Infusoires ciliés, C. R. Acad. d. Sci., civ (1887); E. Metschnikoff, Leçons sur la Pathologie comparée de l'Inflammation (Paris, 1892); C. S. Minot, Senescence and Rejuvenation, J. of Physiol., xii (1891); T. H. Morgan, Experimental Studies on Echinoderm Eggs, Anat. Anz., ix. 5, 6 (1893); Studies of the 'Partial' Larvae of Sphaerechinus, Arch. f. Entwicklungsmech., ii. 1 (1895); Half Embryos and Whole Embryos from one of the first two Blastomeres of the Frog's Egg, Anat. Anz., x. 19 (1895); The Fertilization of Non-nucleated Fragments of Echinoderm Eggs, Arch. f. Entwicklungsmech., ii. 2 (1895); The Production of Artificial Astrospheres, Arch. f. Entwicklungsmech., iii (1896); W. A. Nagel, Ueber Galvanotaxis, Arch. f. d. ges. Physiol., lix (1895); Der Lichtsinn augenloser Thiere (Jena, 1896); W. Pfeffer, Ueber chemotakt. Bewegungen, Untersuch. Bot. Inst. Tübingen, ii (1888); Julia B. Platt, On the Specific Gravity of Spirostomum, Paramecium, and the Tadpole, Amer. Natural., xxxiii (1899); H. Quincke, Ueber den Einfluss des Lichtes auf den Thierkörper, Arch. f. d. ges. Physiol., lvii (1894); A. Rauber, Ueber den Einfluss der Temperatur, Sitzber. d. Naturf.-Ges. z. Leipzig, x (1884); W. Roux, Gesammelte Abhandl. ü. Entwicklungsmech. d. Organismen (Leipzig, 1895); H. S. Russell, The Effects of Mechanical Movement, Bot. Gaz., xvii (1892); J. Sachs, Gesammelte Abhandl. ü. Pflanzenphysiol. (Leipzig, 1892); A. Schaper, Experimental Studies, J. Boston Soc. Med. Sci. (Jan., 1898); Arch. f. Entwicklungsmech., vi (1898); O. v. Sicherer, Chemotaxis der Warmblüter-Leukocyten ausserhalb des Körpers, Münch. med. Wochensch., xliii (1896); E. Strasburger, Wirkung des Lichtes und der Wärme auf Schwärmsporen, Jena. Zeitsch. f. Naturwiss., xii (1878); H. M. Vernon, The Effect of Environment on the Development of Echinoderm Larvae, an Experimental Inquiry into the Causes of Variation, Philos. Trans. Roy. Soc., clxxxvi. B (1895); M. Verworn, Psychophysiologische Protistenstudien (Jena, 1889); Allg. Physiol. (Jena, 1897); General Physiology, an Outline of the Science of Life (Eng. trans., London and New York, 1899; contains a good bibliography); A. D. Waller, Galvano-

tropism of Tadpoles, Sci. Progress, iv (1895); S. Watasé, On the Nature of Cell-Organization, Woods Holl Biol. Lects., 1893 (Boston); C. O. Whitman, The Seat of Formative and Regenerative Energy, J. of Morphol., ii (1888); The Inadequacy of the Cell-theory of Development, Woods Holl Biol. Lects., 1893 (Boston); Evolution and Epigenesis, Woods Holl Biol. Lects., 1894 (Boston); S. R. Williams, The Specific Gravity of some Freshwater Animals in relation to their Habits, Development, and Composition, Amer. Natural., xxxiv (1900); S. Winogradsky, Recherches sur les Organismes de la Nitrification, Ann. d. l'Inst. Pasteur, iv (1890); Recherches sur l'Assimilation, Arch. des Sci. Biol. de St.-Pétersbourg, iii (1895); R. M. Yerkes, Reaction of Entomostraca to Stimulation by Light, Amer. J. of Physiol., iii. 4 (1899); E. Yung, Contributions à l'Histoire de l'Influence des Milieux physiques sur les Êtres vivants, Arch. de Zool., vii (1878), and 2nd series, i (1883); De l'Influence des Lumières colorées sur le Développement des Animaux, Mitteil. d. zool. Stat. zu Neapel, ii (1880), and C. R. Acad. d. Sci., cxv (1892); L. Zender, Die Entstehung des Lebens aus mechanischen Grundlagen entwickelt, Pts. I and II (Tübingen, 1900); O. Hertwig, Zeit- und Streitfragen der Biologie (Jena, i. 1894, ii. 1897); E. B. Wilson, Recent Aspects of Biological Research; Origin of Life and Heredity, Int. Monthly, ii. (1900). (H.H.)

Local Sign: Ger. *Lokalzeichen*; Fr. *signes locaux*; Ital. *segni locali*. A specific 'shading' or 'colouring' of certain sensations whereby every such sensation is invariably referred to a definite position upon the organ or elsewhere in space.

The local signs of pressure may be regarded either as intensive differences of thickness in the epidermis, differences in tightness of the stretching of the skin over underlying parts, &c. (Lotze), or as qualitative (Wundt). The local signs of vision may be simple sensations set up by reflex movements of ocular rotation (Lotze, Helmholtz), similarity and difference of neighbouring and remote impressions (Lipps), or complexes of 'movement' sensations and retinal qualities (see Indirect Vision), such as gradations in colour tone (Wundt, Baldwin). Some sort of local sign is a necessity for theories of space-perception of the class designated genetic nativism in the article Extension (q. v.). In some cases localization can be shown, by experiment, to imply the existence of a disparate local sign: so tactual localization by association with vision. This fact is, so far, an argument for the existence, in other cases, of a local sign in kind. See Space (perception of), and Extension. (E.B.T.)

This sort of localization should be distinguished from the perception of space or of extension. See Spacialization. Specific Localization in Space (q. v., 1) may require a local sign independently of or in addition to the data of the perception of extension, as appears negatively in the vague Localization of Sounds (q. v., also Localization in Space, 2). (J.M.B.)

Literature: Lotze, Med. Psychol. (1852); Stumpf, Ursprung d. Raumvorstellung, 86 ff.; Zeitsch. f. Psychol., iv. 70 ff.; Külpe, Outlines of Psychol., 344, 368 ff.; Sanford, Course in Exper. Psychol., expt. 1; Helmholtz, Physiol. Optik (2nd ed.), 670, 947; Wundt, Physiol. Psychol. (4th ed.), ii. 36 ff., 231 ff.; Human and Animal Psychol., 168 f.; Outlines of Psychol., 105, 127, 134 ff.; Lipps, Psychol. Stud. (1885), i; Grundthatsachen d. Seelenlebens, 476 f., 488 ff., 513 ff., 542 ff.; Funke, in Hermann's Handb. d. Physiol., III. ii. 404 ff. See also under Extension. (E.B.T.)

Localization (cerebral) [Lat. *locus*, place]: Ger. *corticale Localisation*; Fr. *localisations cérébrales* (generally plural); Ital. *localizzazioni funzionali del cervello*. (1) The doctrine that various parts of the brain have relatively distinct functions.

(2) The theory that certain psychical and physiological functions are limited to definite areas or regions of the brain (especially the distribution of conscious activities, such as visual, auditory, and other sensations, as well as voluntary movement of various groups of muscles, to sharply limited areas of cortex).

The theory in its broadest form is thoroughly substantiated by anatomical, pathological, and experimental data.

Two distinct tendencies are represented by the schools headed by Ferrier and Munk on the one hand, and Goltz on the other; the one school claiming that well-defined areas may be recognized, whose functions are limited to reactions upon a single set of muscles or a single class of sensory disturbances, or both; the other laying great emphasis on the unity of the brain, and the fact that injury to any region affects the whole cortex, altering the psychical tone as a whole. Munk claims that such motor disturbances as occur after injury, e. g. to the parietal cortex, depend upon an impairment

of the sensations necessary to the release of such movements.

Probably the two views are not necessarily antagonistic when properly interpreted. It may be granted that certain areas of cortex actually stand primarily related to certain groups of muscles (or their myelonic centres), and certain other areas receive the stimuli elaborated in the primary projection centre for one organ of special sense; but it may still be true that every mental presentation is a result of a process of equilibration in the entire organ, and thus that a localized injury will express itself in alterations of mental tone rather than a simple abolition of a single kind of mental expression or a specific modification of consciousness.

The undoubted fact of substitutional functioning is not difficult to understand in view of the great complexity of the cortex, and especially of the far-reaching intercommunication of its different regions.

The precise and minute delimitation of the motor and sensory areas is of great practical importance as an aid in diagnosis and operation in intra-cranial injuries; but it has much less significance for the proper construction of mental processes than has sometimes been supposed.

Our most reliable data are derived from experimental study of lower animals and records of autopsies in cases of brain trauma. Naturally the results of complete extirpation of the hemispheres have not been observed in man. In a few instances such an operation has succeeded in dogs, with results such as the following: strong irritation of the skin caused the animal to growl and bite, loud noises awakened him from sleep, taste of food excited impulse to eat, and he reacted to some extent to visual stimuli. On the other hand, originative power was destroyed and all trace of recognition and memory was obliterated. In other words, although complicated cyclical reflexes exist, there is no evidence of psychic functions of the higher orders. All voluntary motion is, of course, impossible.

The researches of Munk have proved the very minute delimitation of the motor areas for the limbs and body regions, and also for the special senses. The centrifugal paths from the various parts of the cortical field for vision are said to be arranged to correspond quite minutely with the parts representing the various parts of the retina, so that visual stimuli give rise to co-ordinated oculo-motor reflexes appropriate to direct the axes of vision towards the segment of the retina stimulated, and experimental irritation of these cortical regions calls out the same reflexes—the subject not being under the influence of an anaesthetic.

Removal of a single cortical motor centre, or the cortical centres for both limbs on one side, results in the permanent prevention of all independent voluntary motions of the corresponding muscles, but such motions as are performed in common with other organs, especially those of the corresponding muscles of the other side, may still be performed. So walking, swimming, and co-ordinated motions may coexist with a true cortical hemiplegia, thus showing that the volitional stimulus for correlated motions passes via a secondary apparatus below the cortex. The arrangement explains the possibility of an acquired quasi-reflex mechanism. The areas for general sensation correspond in general to

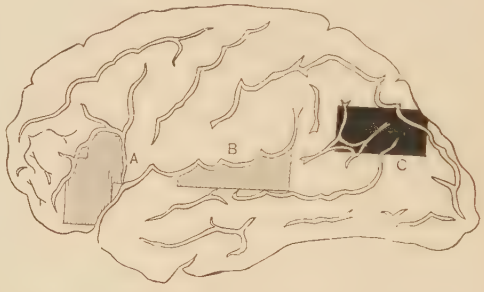


Fig. 1 (reduced from Naunyn). The three cortical fields for aphasia. Areas the injury of which may produce disturbances of speech. *A*. Broca's region, or that controlling the motor activities of speech, injury to which produces motor or atactic aphasia. *B*. Wernicke's area (hindermost two-thirds of first temporal convolution). Injury of this area of cortex produces auditory aphasia. *C*. Visual speech area, injury to which produces word-blindness and visual aphasia.

the cortical motor areas for the same regions, though the two are not mutually inclusive. The reported loss of sensation due to operative injury of the hippocampal region and limbic lobe is probably due to simultaneous injury of corona fibres which here lie near the surface.

While removal of the cortical areas for the extremities destroys permanently the tactile sensations for the corresponding members, the general sensitiveness remains, as also the response to painful irritation. The localized tactile sense is abolished, while

general sensation and pain are simply modified or diminished.

The explanation of the facts of localization is attended with difficulties, but it is rendered simpler by recent histological researches (see BRAIN, and NERVOUS SYSTEM). Munk refers the loss of motor and sensory power resulting from extirpation of the cortical areas to the prevention of the formation of the motor and sensory presentations. A dog whose visual sphere is removed may then be said to suffer psychical blindness, and it would be but a step to add that the motor inco-ordination resulting from injuries to the centres for the extremities is a psychical paralysis (cf. PSYCHIC DUMBNESS). The minute delimitation of the areas for each segment of a sensory field is rendered impossible by the overlapping and intercommunication between them, but there is no reason to doubt the existence of such extensive representation on the cortex. The most recent experiments all confirm the idea that the entire cortical representative apparatus reacts as a single mechanism, so that every 'state of consciousness' is in a sense the product of the equilibration of the totality of cortical activities. The preponderance of activity in one sensory sphere affects this *rapport*, in a way constituting a conscious excitation of that sense. It follows that any injury to one part of the cortex not only abolishes the vestiges of previous excitations of that sense, but enfeebles the entire intelligence, by cutting out a variety of associational vestiges, both of the lost sense excitations and of presentations in which they formed an essential part, though originating in other spheres.

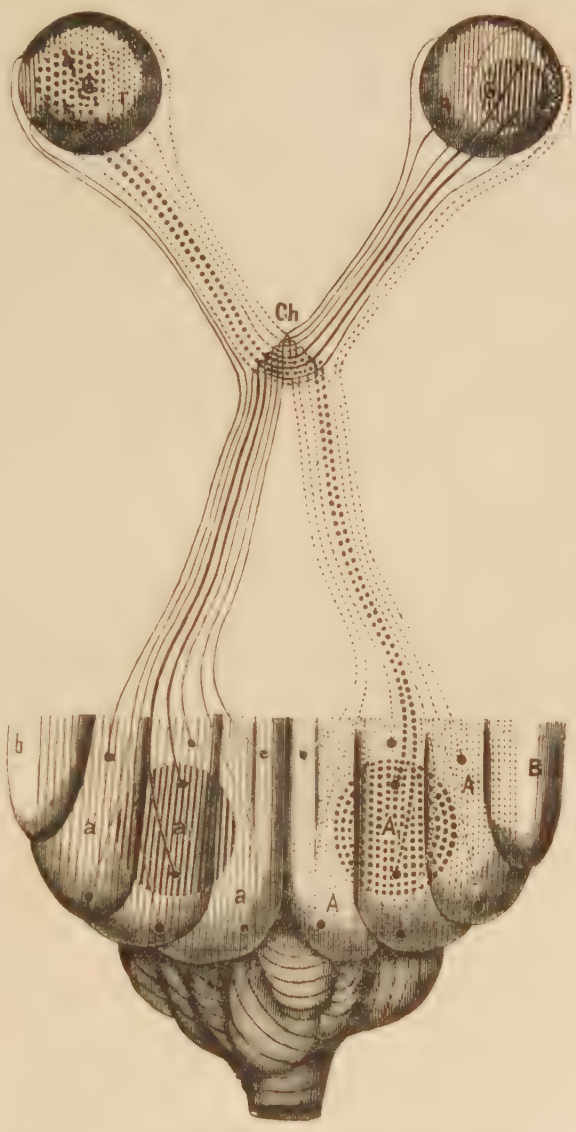


Fig. 2. Diagram of the course of optic fibres to the occipital cortex in the dog. (After Munk.)

Details of localization may be gathered from the figures.

Historical. That the brain is in some way associated with thought was recognized very early, and this view prevailed among the Greek physicians, in spite of the fact that Aristotle described the brain as the most bloodless and inert organ of the body, designed simply to regulate the heat of the latter, much as the condensing vapours of the sky mitigate summer heat and drought. Pythagoras, Hippocrates, and Plato clearly recognized the head as the seat of the intellect and will, while in the days of Ptolemy Soter some attempt was made to localize functions. Erasistratus believed that the sensory nerves

spring from the meninges, while the motor are derived from the substance of the brain itself (a view intelligible when we take into account the close attachment of the sensory ganglia to the meninges). Hierophilus is said to have anticipated Descartes in the belief that the vital forces reside in the ventricles, a view to which the followers of Galen also subscribed. The Arabian physicians and their successors extended the doctrine of localization. Albertus Magnus assigned judgment to the frontal regions, imagination to the parietal, and memory to the occipital. The notion of animal spirits within the ventricles survived to some extent till the 18th century.

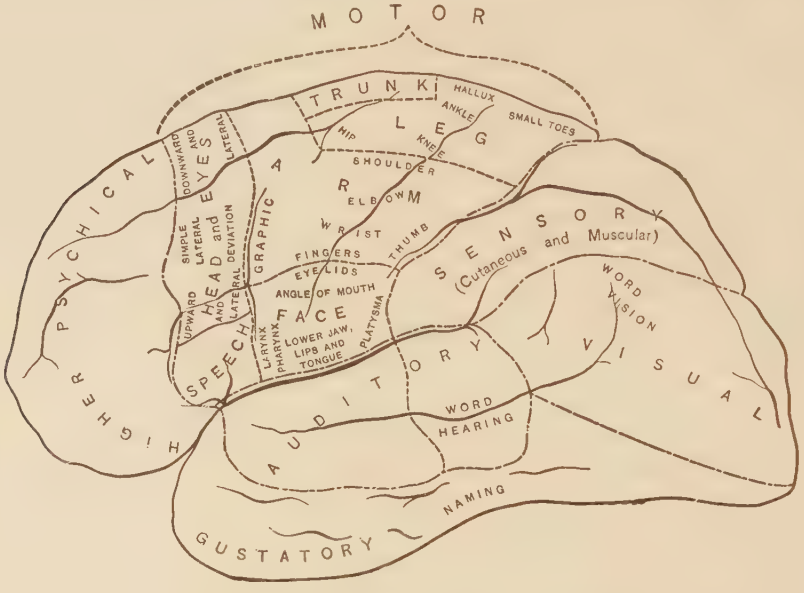


Fig. 3. Zones and centres of the lateral aspect of the human cerebrum. (After Mills.)

Malpighi was the first to ascribe the higher functions to the grey matter.

Descartes was the first to elaborate a consistent theory of brain functioning. Influenced by Harvey's discovery of the mechanics of circulation, he taught that the friction involved in circulation sufficed to vaporize and excite various elements of the blood. Some of these elements pass to the reproductive organs, and behave as the forerunners of Darwin's gemmules might be expected to do, while others, destined to the brain, there evolve the gaseous animal spirits on which nervous action depends. All nerves are tubes containing these spirits. In the sensory nerves the currents set towards the brain, where the agitation is communicated to the central mass of vital fluids therein. The currents thus produced may, under suitable conditions, pass out through the motor nerves to muscles, producing what are now called reflexes. The soul itself is lodged in the 'pineal body,' which was selected from among the organs of the body because of its central azygous position and its close connection with the ventricles. The soul is usually affected by the currents setting from the body, and fabricates its presentations from the impression thus derived, but it also impresses its own acts upon the vital fluids, giving rise to motor currents. Aimless eddies may produce phantasy, and there is a separate mental activity to correspond to each form of disturbance in the vital humours.

Descartes' speculations prepared the way for a variety of localization theories. Willis located memory in the convolutions, imagination in the callosum, sense-perception in the striatum, visual perception in the thalamus, and involuntary motion in the cerebellum. Meyer, on the other hand, regarded the cerebellum as the organ of abstraction, and located memory in the roots of the cranial nerves. Thus the way was prepared for Gall and Spurzheim. Gall's theory rested on the assumption that the skull depends for its form upon the growing brain, that there-

fore its surface reflects the state of development of the brain, and that size and configuration alone determine mental power. To these may be added sundry crude psychological postulates. Though phrenology is primarily a system of psychology, its popularity depended on the purely empirical form in which it was clothed, while what really gave it its power with the masses was the fact that it served to give a scientific character to certain theories which survived astrology under the name of physiognomy or cheiromancy.

The researches of Broca, by which he was enabled, in 1861, to locate a cortical centre for articulate speech, mark the real beginning of the modern doctrine of cortical localization. For a time all disturbances of speech were referred to this area. Our present knowledge permits us to state that lesions of the posterior portion, or *pars opercularis*, of the third frontal gyrus (commonly known as Broca's convolution, marked 'speech' on Fig. 3) produce motor aphasia, called 'Broca's type,' but many hold that it is amnesic aphasia, the pure motor aphasia arising from a subcortical lesion. The accidental discovery by Fritsch and Hitzig, during the Franco-Prussian War, that the galvanic current applied to the cortex is capable of exciting the motor mechanism, opened the way for experimental researches, and from this time onward the pathological method and the experimental have co-operated in the cultivation of this field. For details of localization in the case of speech, see SPEECH AND ITS DEFECTS.

Literature: besides the general treatment in the various physiological psychologies, the following special memoirs may be consulted: BEEVOR and HORSLEY, A Minute Analysis of Cortical Centres in the Monkey, Philos. Trans. Roy. Soc. (1887, 1888); also Arrangement of the Excitable Fibres of the Internal Capsule of the Bonnet Monkey, Philos. Trans. Roy. Soc. (1890, B); BROCA, Sur le Siège de la Faculté du Langage articulé, &c. (Paris, 1861); J. M. CHARCOT and A. PITRES, Les Centres moteurs corticaux chez l'Homme (Paris, 1895); H. H. DONALDSON, Report of Six Lectures on Cerebral Localization, Amer. J. of Psychol., iv (1891); L. F. BARKER, The Sense-areas and Association-centres in the Brain, as described by Flechsig, J. of Nerv. and Ment. Dis., xxiv (June 6, 1897); L. EDINGER, The Significance of the Cortex considered in connection with a Report upon a Dog from which the whole Cerebrum had been removed by Professor Goltz, J. of Compar. Neurol., iii (June, 1893); EXNER, Untersuch. ü. die Localisation d. Functionen in d. Grosshirnrinde des Menschen (1884); FERRIER, The Functions of the Brain (1876); FLOURENS, Recherches expérimentales sur les Propriétés et les Fonctions du Syst. nerv. (1824); FRITSCH and HITZIG, Ueber die electrische Erregbarkeit des Grosshirns (1870); GOLTZ, in Pflüger's Arch. (1876–84), various articles; HERRICK, Neurology and Psychology, J. of Compar. Neurol., i (1891); HORSLEY and SCHÄFER, A Review of Experiments upon the Functions of the Cerebral Cortex, Philos. Trans. Roy. Soc. (1888); LONGET, Anat. et Physiol. du Syst. nerv. (1842); LUCIANI and SEPPILLI, Die Functions-Localisation auf der Grosshirnrinde (Leipzig, 1886), trans. of the original, issued as a prize paper by the R. Ist. Lombardo di Scienze e Lettere (1885); LUCIANI and TAMBURINI, Sulle Funzioni del Cervello, Centri psicomotorii e Centri psicosensorii, Riv. Sperim. di Freniat. (1878–9); LUCIANI, Sulle Funzioni del Cervelletto, Riv. Freniat. (1879), and Il Cervelletto, Pubblicaz. del R. Istituto sup. (Firenze, 1891); MAGENDIE, Leçons sur la Fonction du Syst. nerv. (1884); C. K. MILLS, Cortical Localization in the Light of Recent Researches into the Minute Anatomy of the Cortex, J. of Nerv. and Ment. Dis., N.S., xx. (1895); also Cerebral Localization in the Light of Recent Pathological Researches, J. of Amer. Med. Assoc., xxvi (1896), and The Nerv. Syst. and its Diseases (Philadelphia, 1898); MUNK, Ueber die Functionen der Grosshirnrinde, Gesammelte Mittheilungen (2nd ed., Berlin, 1890); Ueber die Fühlsphären der Grosshirnrinde, Sitzber. kgl. preuss. Akad. zu Berlin (1892 ff.); Ueber den Hund ohne Grosshirn, Arch. f. Anat. u. Physiol., Physiol. Abth. (1894); NOTHNAGEL and NAUNYN, Ueber die Localisation d. Gehirnkrankheiten (1887); J. SOURG, Le Syst. nerv. central (1899); A. TAMBURINI, Contrib. alla Fisiol. e Patol. del Linguaggio, Riv. Freniat. (1875); VULPIAN, Leçons de Physiol. du Syst. nerv. (1866). (H.H.)

Localization (in space). Localization in space is the reference of a sense impression or of an object to a local position.

The two general questions which should be distinguished are those (1) of the distribution of localities on the area of the skin and retina (see LOCAL SIGN), together with the nervous PROJECTION (q. v.) of sensations as such to the surface of the body; and (2) the locating of

objects in the external world. See SPACIALIZATION.

The earliest theory of space localization in the sense of (1) is what Hamilton calls 'the common dogma of the schools, that the soul is all in the whole body, and all in every one of its parts' (Reid's *Works*, Suppl. Diss., 861, note). Then follows the doctrine of Descartes, that the soul immediately perceives the images in the corporeal phantasy, viz. the brain. The modern treatment of the subject may be said to start with Herbart in Germany and with Bain in England.

Literature: for the Herbartian view see VOLKMANN, Lehrb. d. Psychol., ii. 117–26; and for Bain's view see BAIN, The Senses and the Intellect, 415 ff. Cf. the textbooks of psychology. See also EXTENSION, and SPACE (perception of). (G.F.S.–J.M.B.)

Localization (in time). The reference by the subject of an event in his own history to its position in the time series relatively to the present moment and to other events, past and future. See TIME.

The question of the conditions of time localization is comparatively modern. Its detailed treatment begins with the Herbartian psychology in Germany. For something of the theory see TEMPORAL SIGN.

Literature: VOLKMANN, Lehrb. d. Psychol., ii. 11–20. There is little written on the subject by the classical English psychologists; see, however, JAMES MILL, Analysis, chap. x. The best modern reference in English is, perhaps, WARD, art. Psychology, Encyc. Brit., 64–5. See the textbooks of psychology. (G.F.S.–J.M.B.)

Localization of Sounds: Ger. *Lokalisation der Gehörsempfindungen*; Fr. *localisation des sensations auditives*; Ital. *localizzazione* (or *projezione*) *spaziale delle sensazioni uditive*. The reference of sounds to particular localities in space. See SPACIALIZATION. (J.M.B.)

Our apprehension of the distance and direction of sounds appears to be conditioned, primarily, by the relative intensity of the waves that reach the two ears. Localization of sounds is thus a function of BINAURAL HEARING (q. v.). It is doubtful how far the pure auditory perception could have developed without visual perception; and, indeed, no explanation has as yet been proposed that is adequate in detail to the observed phenomena.

Literature: PREYER, Pflüger's Arch., xl; VON KRIES, Zeitsch. f. Psychol., i. 235, 488; MÜNSTERBERG, Beitr. z. exper. Psychol., ii, and (with PIERCE) Psychol. Rev., i. 461; RAYLEIGH, Nature, xiv. 32; SANFORD, Course in Exper. Psychol., expts. 101–3; MATSUMOTO, Yale Studies, v. 1 ff.; SCRIPTURE, ibid., 76 ff.; ANGELL and FITE, Psychol. Rev., viii. 225. (E.B.T.)

Localized Industry: Ger. *Weltwirthschaft, localisirte Industrie*; Fr. *spécialisation (d'industrie) locale*; Ital. *industria locale specializzata*. The division of labour between different communities.

'We may mark off three stages of industrial development. The first is where the distinction of trades is introduced, and men no longer consume all or perhaps any part of the articles they have produced; yet where consumers live near the producer and are personally known to him. The second stage is where the element of personal acquaintance disappears. Production no longer waits for orders, but anticipates demand. The third stage is reached when increasing facilities of communication make the world one trading community. Then the localization of trades proceeds so far that one country, or perhaps one group of towns, produces the greater part of all the goods of a certain sort that are consumed throughout the world' (Walker). (A.T.H.)

Locke, John. (1632–1704.) Born at Wrington, Somersetshire, England, he was educated at Westminster School, London, and Christ Church, Oxford. Secretary to Sir Walter Vane at Berlin, &c., 1665–6; formed the acquaintance of Ashley, afterwards Earl of Shaftesbury, 1666. He entered Lord Ashley's family, directing the education of his son and grandson. As lord chancellor, Shaftesbury made him 'secretary of presentations' to benefices. He stayed in France and Italy, 1675–9, and in Holland, 1684–9. In 1690 he published his famous 'Essay,' and died at Oates in Essex, Oct. 28, 1704. He is founder of English EMPIRICISM (q. v., also SENSATIONALISM).

Locomotion (1), and (2) **Locomotor** [Lat. *locus*, place, + *motio*, a moving]: Ger. (1) *Locomotion*, (2) *Bewegungs-(werkzeug*, &c.); Fr. *locomotion, locomoteur*; Ital. (1) *locomozione*, (2) *locomotore*. (1) The act or power of moving from place to place. (2) Pertaining to the mechanism of locomotion. See MOVEMENT, and MUSCLE. (C.F.H.)

Logic [Gr. λογική]: Ger. *Logik*; Fr. *logique*; Ital. *logica*. Logic is a science which has not yet completed the stage of disputes concerning its first principles, although it is probably about to do so. Nearly a hundred definitions of it have been given. It will, however, generally be conceded that

its central problem is the classification of arguments, so that all those that are bad are thrown into one division, and those which are good into another, these divisions being defined by marks recognizable even if it be not known whether the arguments are good or bad. Furthermore, logic has to divide good arguments by recognizable marks into those which have different orders of validity, and has to afford means for measuring the strength of arguments.

An approach to such a classification is made by every man whenever he reasons, in the proper sense of that term. It is true that the contemplation of a state of things believed to be real may cause the contemplator to believe something additional, without making any classification of such sequences. But in that case he does not criticize the procedure, nor so much as distinctly reflect that it is just. He can, consequently, not exercise any control over it. Now, that which is uncontrollable is not subject to any normative laws at all; that is, it is neither good nor bad; it neither subserves an end nor fails to do so. But it is only the deliberate adoption of a belief in consequence of the admitted truth of some other proposition which is, properly speaking, reasoning. In that case the belief is adopted because the reasoner conceives that the method by which it has been determined would either in no analogous case lead to a false conclusion from true premises, or, if steadily adhered to, would at length lead to an indefinite approximation to the truth, or, at least, would assure the reasoner of ultimately attaining as close an approach to the truth as he can, in any way, be assured of attaining. In all reasoning, therefore, there is a more or less conscious reference to a general method, implying some commencement of such a classification of arguments as the logician attempts. Such a classification of arguments, antecedent to any systematic study of the subject, is called the reasoner's *logica utens*, in contradistinction to the result of the scientific study, which is called *logica docens*. See REASONING.

That part of logic, that is, of *logica docens*, which, setting out with such assumptions as that every assertion is either true or false, and not both, and that some propositions may be recognized to be true, studies the constituent parts of arguments and produces a classification of arguments such as is above described, is often considered to embrace the whole of logic; but a more correct designation is Critic (Gr. *κριτική*. According to Diogenes Laertius, Aristotle divided logic into three parts, of which one was *πρὸς κρίσιν*). This word, used by Plato (who divides all knowledge into *epitactic* and *critic*), was adopted into Latin by the Ramists, and into English by Hobbes and Locke. From the last it was taken into German by Kant, who always writes it Critik, the initial *c* being possibly a reminiscence of its English origin. At present it is written Kritik in German. Kant is emphatic in the expression of the wish that the word may not be confounded with critique, a critical essay (Ger. Kritik). [The forms Critique and Critic are used interchangeably in this work. (Cf. CRITICISM.) (J.M.B.)]

It is generally admitted that there is a doctrine which properly antecedes what we have called critic. It considers, for example, in what sense and how there can be any true proposition and false proposition, and what are the general conditions to which thought or signs of any kind must conform in order to assert anything. Kant, who first raised these questions to prominence, called this doctrine transcendentale Elementarlehre, and made it a large part of his *Critic of the Pure Reason*. But the *Grammatica Speculativa* of Scotus is an earlier and interesting attempt. The common German word is Erkenntnisstheorie, sometimes translated EPISTEMOLOGY (q. v.).

It is further generally recognized that another doctrine follows after critic, and which belongs to, or is closely connected with, logic. Precisely what this should contain is not agreed; but it must contain the general conditions requisite for the attainment of truth. Since it may be held to contain more, one hesitates to call it heuristic. It is often called Method; but as this word is also used in the concrete, methodic or methodeutic would be better.

For deciding what is good logic and what bad, appeal is made by different writers to one or more, generally several, of these eight sources: to direct dicta of consciousness, to psychology, to the usages of language, to metaphysical philosophy, to history, to everyday observation, to mathematics, and to some process of dialectic. In the middle ages appeal was frequently made to authority.

The appeal to direct consciousness consists in pronouncing certain reasoning to be good or bad because it is felt to be so. This is a very common method. Sigwart, for example, bases all logic upon our invincible mental repulsion against contradiction, or, as he calls it, 'the immediate feeling of necessity' (*Logic*, § 3, 2). Those who think it worth while to

make any defence at all of this proceeding urge, in effect, that, however far the logician may push his criticisms of reasoning, still, in doing so, he must reason, and so must ultimately rely upon his instinctive recognition of good and bad reasoning. Whence it follows that, in Sigwart's words, 'every system of logic must rest upon this principle.' It is, however, to be noted that among the dicta of direct consciousness, many pronounce certain reasonings to be bad. If, therefore, such dicta are to be relied upon, man not only usually has a tendency to reason right, but also sometimes has a tendency to reason wrong; and if that be so, the validity of a reasoning cannot *consist* in a man's having a tendency to reason in that way. Some say that the validity of reasoning consists in the 'definitive dictum' of consciousness; but it has been replied that certain propositions in Euclid were studied for two thousand years by countless keen minds, all of whom had an immediate feeling of evidence concerning their proofs, until at last flaws were detected in those proofs, and are now admitted by all competent persons; and it is claimed that this illustrates how far from possible it is to make direct appeal to a definitive pronouncement. Besides, say those who object to this method, all reasoning and inquiry expects that there is such a thing as the truth concerning whatever question may be under examination. Now, it is of the very essence of this 'truth,' the meaning of the expectation, that the 'truth' in no wise depends upon what any man to whom direct appeal can be made may opine about that question. *A fortiori* it does not depend upon whether I am satisfied with it or not. It is further insisted that there can be no genuine criticism of a reasoning until that reasoning is actually doubted; and no sooner is it actually doubted than we find that consciousness has revoked her *dictum* in its favour, if she ever made any. It is, indeed, maintained that so far from true is it that every system of logic must be based upon any instinctive recognition of good and bad reasoning, that it is quite impossible for any reasoning to be based upon such recognition in respect to that same reasoning. In reasoning, a man may feel sure he is right; but to 'rest' that confidence on nothing but itself is to rest it on nothing at all. If the fact that we must use our reasoning instinct in criticizing reasoning proves that we must appeal to nothing else in such criticism, it equally proves that we ought to follow the lead of that instinct without any logical control at all, which would be as much as to say that we ought not to reason at all. A man cannot criticize every part of his reasoning, since he cannot criticize the act of reasoning he is performing in the criticism, it is true. But he can criticize steps whose validity he doubts; and in doing so, ought to consider in what characters the validity of reasoning consists, and whether the reasoning in question possesses those characters.

Under an appeal to psychology is not meant every appeal to any fact relating to the mind. For it is, for logical purposes, important to discriminate between facts of that description which are supposed to be ascertained by the systematic study of the mind, and facts the knowledge of which altogether antecedes such study, and is not in the least affected by it; such as the fact that there is such a state of mind as doubt, and the fact that the mind struggles to escape from doubt. Even facts like these require to be carefully examined by the logician before he uses them as the basis of his doctrine. But many logicians have gone much further, and have avowedly based their systems upon one or another theory of psychology. Another class of logicians have professed to base logic upon a psychological theory of cognition. Of course, if this is done, such psychological doctrine is placed above logical criticism, or, at any rate, above logical support. For if the truth of a conclusion is known only from certain premises, it cannot be used to support those premises. Now, it may be doubted whether psychology is not, of all the special sciences, the one which stands most in need of appeal to a scientific logic.

Appeals to the usages of language are extremely common. They are made even by those who use algebraical notation in logic 'in order to free the mind from the trammels of speech' (Schröder, *Logik*, i. p. iii). It is difficult to see what can be hoped for from such a proceeding, unless it be to establish a psychological proposition valid for all minds. But to do this, it would be necessary to look beyond the small and very peculiar class of Aryan languages, to which the linguistic knowledge of most of those writers is confined. The Semitic languages, with which some of them are acquainted, are too similar to the Aryan greatly to enlarge their horizon. Moreover, even if other languages are examined, the value of any logical inferences from them is much diminished by the custom of our grammarians of violently fitting them to the Procrustean bed of Aryan grammar.

The objection which has been suggested to appeals to psychological results applies with far greater force to appeals to metaphysical philosophy, which, it will generally be conceded, can hardly take a step with security unless it rests upon the science of logic. Nevertheless, a great many logical treatises of various colours make it their boast that they are built upon philosophical principles.

Logicians occasionally appeal to the history of science. Such and such a mode of reasoning, it is said, for example, was characteristic of mediaevalism or of ancient science; such another produced the successes of modern science. If logic is to be based upon probable reasonings, as some logicians maintain that it must be, such arguments, if critically examined, must be admitted to have great weight. They will naturally be out of place in a system of logic which professes to demonstrate from certain initial assumptions that the kinds of reasoning it recommends must be accepted.

There is probably room for dispute as to whether logic need assert anything at all as an absolute matter of fact. If it does not, any appeal to experience would seem to be irrelevant. If it does, still the opinion may be that such assertions of logic are of so exceedingly broad and slight a nature that the universal experience of every man's every day and hour puts them beyond all doubt—such experiences as that the world presents appearances of variety, of law, and of the real action of one thing upon another. As appearances, these things do not seem likely ever to be doubted. If logic has need of any facts, and if such facts will suffice, no objection can well be made to an appeal to them.

The boundary between some parts of logic and pure mathematics in its modern treatment is almost evanescent, as may be seen in Dedekind's *Was sind und was sollen die Zahlen* (1888, Eng. trans. 1901). There are, however, departments of logic, such as the logic of probable inference (if that be regarded a part of logic), in which appeal is sometimes made to mathematical results, such as Bernoulli's law of high numbers. It seems to be the general opinion that nothing so difficult as mathematics can be admitted into, or be appealed to by, the science of logic, which has the peculiarity of consisting chiefly of truisms.

In mathematical reasoning there is a sort of observation. For a geometrical diagram or array of algebraical symbols is constructed according to an abstractly stated precept, and between the parts of such diagram or array certain relations are observed to obtain, other than those which were expressed in the precept. These being abstractly stated, and being generalized, so as to apply to every diagram constructed according to the same precept, give the conclusion. Some logicians hold that an equally satisfactory method depends upon a kind of inward observation, which is not mathematical, since it is not diagrammatic, the development of a conception and its inevitable transformation being observed and generalized somewhat as in mathematics; and those logicians base their science upon such a method, which may conveniently be termed, and is sometimes termed, a Dialectic. Other logicians regard such a method as either extremely insecure or as altogether illusory.

The generally received opinion among professors of logic is that all the above methods may properly be used on occasion, the appeal to mathematics, however, being less generally recognized.

Literature: the history of logic in Western Europe, down to the revival of learning, is given by PRANTL, Gesch. d. Logik im Abendlande. Upon the points upon which this author touches, he always affords valuable information, though his judgments are peremptory and slashing. Unfortunately, he omits much which was regarded by the authors of whom he treats as most important, because he does not himself so regard it. He also omits much which would be interesting to a reader taking a broader conception of logic. It is hardly necessary to say that upon some large subjects his views are controverted. Of the modern development of logic there is no satisfactory history; but there are notices good as far as they go in UEBERWEG, Syst. d. Logik (Eng. trans.); in the much earlier work of BACHMANN, Syst. d. Logik (1828); in HAMILTON, Lects. on Logic; and for later work in B. ERDMANN, Logik. CH. SIGWART, Logic (Eng. trans.), and WUNDT, Logik, may also be profitably consulted. See under the logical topics generally (e. g. EMPIRICAL LOGIC, FORMAL LOGIC, JUDGMENT, and PROPOSITION); and also BIBLIOG. C. (C.S.P., C.L.F.)

Logic (Hegel's *Logik*): see HEGEL'S TERMINOLOGY, II *b*.

Logic (exact): Ger. *exakte Logik*; Fr. *logique exacte*; Ital. *logica esatta*. The doctrine that the theory of validity and strength of reasoning ought to be made one of the 'exact sciences,' that is, that generalizations

from ordinary experience ought, at an early point in its exposition, to be stated in a form from which by mathematical, or expository, REASONING (q. v.), the rest of the theory can be strictly deduced; together with the attempt to carry this doctrine into practice.

This method was pursued, in the past, by Pascal (1623–62), Nicolas Bernoulli (1687–1759), Euler (1708–83), Ploucquet (1716–90), Lambert (1728–77), La Place (1749–1827), De Morgan (1806–71), Boole (1815–64), and many others; and a few men in different countries continue the study of the problems opened by the last two named logicians, as well as those of the proper foundations of the doctrine and of its application to inductive reasoning. The results of this method, thus far, have comprised the development of the theory of probabilities, the logic of relatives, advances in the theory of inductive reasoning (as it is claimed), the syllogism of transposed quantity, the theory of the Fermatian inference, considerable steps towards an analysis of the logic of continuity and towards a method of reasoning in topical geometry, contributions towards several branches of mathematics by applications of 'exact' logic, the logical graphs called after Euler and other systems for representing in intuitional form the relations of premises to conclusions, and other things of the same general nature.

There are those, not merely outside the ranks of exact logic, but even within it, who seem to suppose that the aim is to produce a calculus, or semi-mechanical method, for performing all reasoning, or all deductive inquiry; but there is no reason to suppose that such a project, which is much more consonant with the ideas of the opponents of exact logic than with those of its serious students, can ever be realized. The real aim is to find an indisputable theory of reasoning by the aid of mathematics. The first step in the order of logic towards this end (though not necessarily the first in the order of inquiry) is to formulate with mathematical precision, definiteness, and simplicity, the general facts of experience which logic has to take into account.

The employment of algebra in the investigation of logic is open to the danger of degenerating into idle trifling of too rudimentary a character to be of mathematical interest, and too superficial to be of logical interest. It is further open to the danger that the rules of the symbols employed may be mistaken for first principles of logic. An algebra which brings along with it hundreds of purely formal theorems of no logical import whatever must be admitted, even by the inventor of it, to be extremely defective in that respect, however convenient it may be for certain purposes. On the other hand, it is indisputable that algebra has an advantage over speech in forcing us to reason explicitly and definitely, if at all. In that way it may afford very considerable aid to analysis. It has been employed with great advantage in the analysis of mathematical reasonings.

Algebraic reasoning involves intuition just as much as, though more insidiously than, does geometrical reasoning; and for the investigation of logic it is questionable whether the method of graphs is not superior. Graphs cannot, it is true, readily be applied to cases of great complexity; but for that very reason they are less liable to serve the purposes of the logical trifler. In the opinion of some exact logicians, they lead more directly to the ultimate analysis of logical problems than any algebra yet devised. See LOGICAL DIAGRAM (OR GRAPH).

It is logical algebra, however, which has chiefly been pursued. De Morgan invented a system of symbols, which had the signal advantage of being entirely new and free from all associations, misleading or otherwise. Although he employed them for synthetical purposes almost exclusively, yet the great generality of some of the conceptions to which they led him is sufficient to show that they might have been applied with great advantage in analysis. Boole was led, no doubt from the consideration of the principles of the calculus of probabilities, to a wonderful application of ordinary algebra to the treatment of all deductive reasoning not turning upon any relations other than the logical relations between non-relative terms. By means of this simple calculus, he took some great steps towards the elucidation of probable reasoning; and had it not been that, in his pre-Darwinian day, the notion that certain subjects were profoundly mysterious, so that it was hopeless, if not impious, to seek to penetrate them, was still prevalent in Great Britain, his instrument and his intellectual force were adequate to carrying him further than he actually went. Most of the exact logicians of to-day are, from the nature of the case, followers of Boole. They have modified his algebra by disusing his addition, subtraction, and division, and by introducing a sign of logical aggregation. This was first

done by Jevons; and he proposed ·|·, a sign of division turned up, to signify this operation. Inasmuch as this might easily be read as three signs, it would, perhaps, be better to join the two dots by a light curve, thus Ψ. Some use the sign + for logical aggregation. The algebra of Boole has also been amplified so as to fit it for the logic of relatives. The system is, however, far from being perfect. See RELATIVES (logic of).

Certain terms of exact logic may be defined as follows:—

Aggregation. The operation of uniting two or more terms or propositions, called *aggregants*, to produce an *aggregate* term or proposition which is true of everything of which any aggregant is true, and false of everything of which all the aggregants are false. It is opposed to *composition*, which is the operation of producing from two or more terms or propositions, called the *components*, a new term or proposition, called their *compound*, which is true of all of which all the components are true, and false of all of which any are false.

Absorption, law of (Ger. *Absorptionsgesetz*). The proposition that if of two aggregants one contains the other as a component, the aggregate is identical with the latter.

Alternative proposition. A term preferred by some logicians to 'disjunctive,' because the latter term is often, as by Cicero and Aulus Gellius, understood to imply that one, and one only, of the alternatives is true. At the same time, the standard traditional example of a disjunctive was 'Socrates currit vel Plato disputat,' and the rule was 'Ad veritatem disiunctivae sufficit alteram partem esse veram.' Nevertheless, the narrower sense was also recognized, and the term alternative is perhaps preferable.

Associative. An operation combining two elements is *associative* if, and only if, in combining the result with a third element, it makes no difference whether the middle element be first combined with the last and the result with the first, or the other way, so long as the order of sequence is preserved. Addition and multiplication are associative, while involution is not so; for ten to the three-square power is a milliard, while ten cube squared is only a million. An associative algebra is an algebra in which multiplication is associative.

Commutative. An operation by which two elements are united is said to be *commutative* if, and only if, it makes no difference which is taken first. Thus, because twice three is thrice two, numerical multiplication is commutative.

Composition: see *Aggregation*, above.

Compound: see *Aggregation*, above.

Copula is often defined as that which expresses the relation between the subject-term and the predicate-term of a proposition. But this is not sufficiently accurate for the purposes of exact logic. Passing over the objection that it applies only to categorical propositions, as if conditional and copulative propositions had no copula, contrary to logical tradition, it may be admitted that a copula often does fulfil the function mentioned; but it is only an accidental one, and its essential function is quite different. Thus, the proposition 'Some favoured patriarch is translated' is essentially the same as 'A translated favoured patriarch is'; and 'Every mother is a lover of that of which she is a mother' is the same as 'A mother of something not loved by her is not.' In the second and fourth forms, the copula connects no terms; but if it is dropped, we have a mere term instead of a proposition. Thus the essential office of the copula is to express a relation of a general term or terms to the universe. The universe must be well known and mutually known to be known and agreed to exist, in some sense, between speaker and hearer, between the mind as appealing to its own further consideration and the mind as so appealed to, or there can be no communication, or 'common ground,' at all. The universe is, thus, not a mere concept, but is the most real of experiences. Hence, to put a concept into relation to it, and into the relation of describing it, is to use a most peculiar sort of sign or thought; for such a relation must, if it subsist, *exist* quite otherwise than a relation between mere concepts. This, then, is what the copula essentially does. This it may do in three ways: first, by a vague reference to the universe collectively; second, by a reference to all the individuals existent in the universe distributively; third, by a vague reference to an individual of the universe selectively. 'It is broad daylight,' I exclaim, as I awake. My universe is the momentary experience as a whole. It is that which I connect as object of the composite photograph of daylight produced in my mind by all my similar experiences. Secondly, 'Every woman loves something' is a description of every existing individual in the universe. Every such individual is said to be coexistent only with what, so far as it

is a woman at all, is sure to be a lover of some existing individual. Thirdly, 'Some favoured patriarch is translated' means that a certain description applies to a select individual. A hypothetical proposition, whether it be conditional (of which the alternative, or disjunctive, proposition is a mere species, or *vice versa*, as we choose to take it) or copulative, is either general or *ut nunc*. A general conditional is precisely equivalent to a universal categorical. 'If you really want to be good, you can be,' means 'Whatever determinate state of things may be admissibly supposed in which you want to be good is a state of things in which you can be good.' The universe is that of determinate states of things that are admissible hypothetically. It is true that some logicians appear to dispute this; but it is manifestly indisputable. Those logicians belong to two classes: those who think that logic ought to take account of the difference between one kind of universe and another (in which case, several other *substantiae* of propositions must be admitted); and those who hold that logic should distinguish between propositions which are necessarily true or false together, but which regard the fact from different aspects. The exact logician holds it to be, in itself, a defect in a logical system of expression, to afford different ways of expressing the same state of facts; although this defect may be less important than a definite advantage gained by it. The copulative proposition is in a similar way equivalent to a particular categorical. Thus, to say 'The man might not be able voluntarily to act otherwise than physical causes make him act, whether he try or not,' is the same as to say that there is a state of things hypothetically admissible in which a man tries to act one way and voluntarily acts another way in consequence of physical causes. As to hypotheticals *ut nunc*, they refer to no range of possibility, but simply to what is true, vaguely taken collectively.

Although it is thus plain that the action of the copula in relating the subject-term to the predicate-term is a secondary one, it is nevertheless necessary to distinguish between copulas which establish different relations between these terms. Whatever the relation is, it must remain the same in all propositional forms, because its nature is not expressed in the proposition, but is a matter of established convention. With that proviso, the copula may imply any relation whatsoever. So understood, it is the *abstract copula* of De Morgan (*Camb. Philos. Trans.*, x. 339). A *transitive* copula is one for which the mood Barbara is valid. Schröder has demonstrated the remarkable theorem that if we use IS in small capitals to represent any one such copula, of which 'greater than' is an example, then there is some relative term r, such that the proposition 'S IS P' is precisely equivalent to 'S is r to P and is r to whatever P is r to.' A *copula of correlative inclusion* is one for which both Barbara and the formula of identity hold good. Representing any one such copula by *is* in italics, there is a relative term r, such that the proposition 'S *is* P' is precisely equivalent to 'S is r to whatever P is r to.' If the last proposition follows from the last but one, no matter what relative r may be, the copula is called the *copula of inclusion*, used by C. S. Peirce, Schröder, and others. De Morgan uses a copula defined as standing for any relation both transitive and convertible. The latter character consists in this, that whatever terms I and J may be, if we represent this copula by **is** in black=letter, then from 'I **is** J' it follows that 'J **is** I.' From these two propositions, we conclude, by Barbara, that 'I **is** I.' Such copulas are, for example, 'equal to,' and 'of the same colour as.' For any such copula there will be some relative term r, such that the proposition 'S **is** P' will be precisely equivalent to 'S is r to everything, and only to everything, to which P is r.' Such a copula may be called a copula of correlative identity. If the last proposition follows from the last but one, no matter what relative r may be, the copula is the *copula of identity* used by Thomson, Hamilton, Baynes, Jevons, and many others.

It has been demonstrated by Peirce that the copula of inclusion is logically simpler than that of identity.

Diagram: see LOGICAL DIAGRAM.

Dialogism. A form of reasoning in which from a single premise a disjunctive, or alternative, proposition is concluded introducing an additional term; opposed to a syllogism, in which from a copulative proposition a proposition is inferred from which a term is eliminated.

Syllogism.

All men are animals, and all animals are mortal;

∴ All men are mortal.

Dialogism.

Some men are not mortal;

∴ Either some men are not animals, or some animals are not mortal.

Dimension. An element or respect of extension of a logical universe of such a nature that the same term which is individual in one such element of extension is not so in another. Thus, we may consider different persons as individual in one respect, while they may be divisible in respect to time, and in respect to different admissible hypothetical states of things, &c. This is to be widely distinguished from different universes, as, for example, of things and of characters, where any given individual belonging to one cannot belong to another. The conception of a multidimensional logical universe is one of the fecund conceptions which exact logic owes to O. H. Mitchell. Schröder, in his then second volume, where he is far below himself in many respects, pronounces this conception 'untenable.' But a doctrine which has, as a matter of fact, been held by Mitchell, Peirce, and others, on apparently cogent grounds, without meeting any attempt at refutation in about twenty years, may be regarded as being, for the present, at any rate, tenable enough to be held.

Dyadic relation. A fact relating to two individuals. Thus, the fact that A is similar to B, and the fact that A is a lover of B, and the fact that A and B are both men, are dyadic relations; while the fact that A gives B to C is a triadic relation. Every relation of one order of relativity may be regarded as a relative of another order of relativity if desired. Thus, *man* may be regarded as *man coexistent with*, and so as a relative expressing a dyadic relation, although for most purposes it will be regarded as a monad or non-relative term.

Index (in exact logic): see sub verbo.

Many other technical terms are to be found in the literature of exact logic.

Literature: for the study of exact logic in its more recent development, excluding probability, the one quite indispensable book is Schröder, Algebra d. Logik; and the bibliography therein contained is so exhaustive that it is unnecessary to mention here any publications previous to 1890. Schröder's pains to give credit in full measure, pressed down and running over, to every other student is hardly less remarkable than the system, completeness, and mathematical power of his work, which has been reviewed by C. S. Peirce in the Monist, vii. 19–40, 171–217. See also C. S. Peirce, Studies in Logic; Pop. Sci. Mo., xii. 1; and Proc. Amer. Acad. Arts and Sci., vii. 287. Cf. Scientific Method. (C.S.P.)

Logic (of chance): see Probability.

Logic (of emotion): see Terminology, English, 'Affective Logic.'

Logic (social): see Social Logic.

Logic (symbolic): see Symbolic Logic.

Logical [Lat. *logicalis*, from *logica*, logic]: Ger. *logisch*; Fr. *logique*; Ital. *logico*. Irrespective of any facts except those of which logic needs to take cognizance, such as the facts of doubt, truth, falsity, &c.

Logical possibility is, according to usage, freedom from all contradiction, explicit or implicit; and any attempt to reform the inaccuracy would only bring confusion.

Logical necessity is the necessity of that whose contrary is not logically possible.

Logical induction is an induction based on examination of every individual of the class to which the examination relates. Thus, conclusions from a census are logical inductions. While this mode of inference is a degenerate form of induction, it also comes into the class of dilemmatic reasoning.

Logical truth is a phrase used in three senses, rendering it almost useless.

1. The harmony of a thought with itself. Most usually so defined, but seldom so employed. So far as this definition is distinct, it makes logical truth a synonym for logical possibility; but, no doubt, more is intended (Hamilton, *Lects. on Logic*, xxvii).

2. The conformity of a thought to the laws of logic; in particular, in a concept, consistency; in an inference, validity; in a proposition, agreement with assumptions. This would better be called *mathematical truth*, since mathematics is the only science which aims at nothing more (Kant, *Krit. d. reinen Vernunft*, 1st ed., 294).

3. More properly, the conformity of a proposition with the reality, so far as the proposition asserts anything about the reality. Opposed, on the one hand, to metaphysical truth, which is an affection of the *ens*, and on the other hand to ethical *truth*, which is telling what a witness believes to be true (Burgersdicius, *Inst. Met.*, chap. xviii).

Logical parts and whole. Parts and whole of logical extension.

Logical reasoning. Reasoning in accordance with a Leading Principle (q.v.) which thorough analysis, discussion, and experience have shown must lead to the truth, in so far as it is relied upon. But what Aristotle

understood by a logical demonstration may be seen in his *De generatione animalium*, Lib. II. cap. viii.

Logical presumption. A Wolffian term for synthetic reasoning, that is, induction and analogy; for hypothetic reasoning was not recognized as reasoning at all. The uniformity of nature is called the *principle of logical presumption.*

Logical division. Division into logical parts.

Logical distinctness. That distinctness which results from logical analysis.

Logical actuality. Kant, in the *Logik* by Jäsche (Einleitung, vii), defines logical actuality as conformity to the principle of sufficient reason, consisting of the cognition having reasons and having no false consequences; and he makes this, along with logical possibility, to constitute logical truth, which is thus used in its second sense. But in the *Critic of the Pure Reason*, in discussing the functions of judgments (1st ed., 75), he says that an assertoric proposition asserts logical actuality (Wirklichkeit, which Max Müller wrongly translates 'reality'), and makes this phrase synonymous with logical truth (which is thus used in its third, and proper, sense).

Logical definition. A strict definition by genus and specific difference. Ockham and his followers objected to the designation on the ground that the logician, as such, had no occasion to define any ordinary term, such as man (*Tractatus logices*, Pt. I. chap. xxvi). (C.S.P.)

Logical Diagram (or **Graph**): Ger. *logische Figur*; Fr. *diagramme logique*; Ital. *diagramma logico.* A diagram composed of dots, lines, &c., in which logical relations are signified by such spatial relations that the necessary consequences of these logical relations are at the same time signified, or can, at least, be made evident by transforming the diagram in certain ways which conventional 'rules' permit.

In order to form a system of graphs which shall represent ordinary syllogisms, it is only necessary to find spatial relations analogous to the relations expressed by the copula of inclusion and its negative and to the relation of negation. Now all the formal properties of the copula of inclusion are involved in the principle of identity and the *dictum de omni.* That is, if r is the relation of the subject of a universal affirmative to its predicate, then, whatever terms X, Y, Z may be,

Every X is r to an X; and

if every X is r to a Y, and every Y is r to a Z, every X is r to a Z. Now, it is easily proved by the logic of relatives, that to say that a relation r is subject to these two rules, implies neither more nor less than to say that there is a relation l, such that, whatever individuals A and B may be,

If nothing is in the relation l to A without being also in the same relation l to B, then A is in the relation r to B; and conversely, that,

If A is r to B, there is nothing that is l to A except what is l to B.

Consequently, in order to construct such a system of graphs, we must find some spatial relation by which it shall appear plain to the eye whether or not there is anything that is in that relation to one thing without being in that relation to the other. The popular Euler's diagrams fulfil one-half of this condition well by representing A as an oval inside the oval B. Then, l is the relation of being included within; and it is plain that nothing can be inside of A without being inside B. The relation of the copula is thus represented by the spatial relation of 'enclosing only what is enclosed by.' In order to represent the negation of the copula of inclusion (which, unlike that copula, asserts the existence of its subject), a dot may be drawn to represent some existing individual. In this case the subject and predicate ovals must be drawn to intersect each other, in order to avoid asserting too much. If an oval already exists cutting the space in which the dot is to be placed, the latter should be put on the line of that oval, to show that it is doubtful on which side it belongs; or, if an oval is to be drawn through the space where a dot is, it should be drawn through the dot; and it should further be remembered that if two dots lie on the boundaries of one compartment, there is nothing to prevent their being identical. The relation of negation here appears as 'entirely outside of.' For a later practical improvement see Venn, *Symbolic Logic*, chap. xi. (C.S.P.)

Logical Machine: Ger. *logische Machina*; Fr. *machine logique*; Ital. *macchine logistiche* (E.M.). An instrument devised to facilitate by mechanical means the handling of logical symbols or diagrams.

There are three such instruments which merit attention:—

(1) The first was constructed by W. Stanley Jevons in 1869 (announced in his *Substitution of Similars*, 1869, 60; described in *Philos.*

Trans. Roy. Soc., 1870, 497–518; brief description in *Proc. Roy. Soc.*, 1870, 166–9, and *Princ. of Sci.*, 1874, 123–31). This instrument was preceded by the logical slate and the logical ABACUS (q. v.) (*Proc. Manchester Lit. and Philos. Soc.*, Apr. 1866, 161; *Substitution of Similars*, 1869, 54–9). In the logical slate the combinations of letters, representing all the possible combinations of a definite number of characters or qualities in a logical universe, were engraved in vertical columns upon a common writing-slate. The combinations inconsistent with given premises were then crossed off with a slate pencil, and the conclusions read off from the untouched combinations.

In the logical abacus the combinations were marked on flat slips of wood arranged in horizontal lines on an inclined blackboard having a series of ledges. The slips of wood were furnished with pins, so that those which represented combinations consistent with the premises could be lifted by means of a ruler to the ledge above.

In the logical slate, great care was necessary to cross off all the inconsistent combinations, and in the logical abacus similar care was required in picking out all the consistent combinations. The logical machine of Jevons is a logical abacus in which all that is required of the operator is to press the premises upon a series of keys; the operation of lifting the combinations consistent with the premises to the higher level being accomplished mechanically by a series of levers. By means of a lattice-work with horizontal slits, the combinations expressed in the premises and consistent with them, and these only, are exhibited to view. This machine, while manifesting considerable ingenuity on the part of the contriver, was nevertheless a cumbersome piece of mechanism. The key-board required two sets of keys, one series for the subject and one for the predicate, and four operation keys, known as the finis, conjunction, copula, and full-stop keys. The combinations were marked upon vertical rods, and a double set of these rods was required. The complex character of this machine rendered it unfit to be extended to problems involving more than four terms. At one time Jevons contemplated constructing a machine like it for ten terms, but found that he would have to sacrifice the entire wall-space of one side of his library.

(2) John Venn in 1881 devised a more compact instrument, which he called a logical diagram machine (*Symbolic Logic*, 1881, 122). It was also constructed for problems of four terms. For problems of three terms he had used diagrams consisting of intersecting circles, shading out those portions which represented combinations inconsistent with given premises. For four terms, circles were impracticable, hence he used ellipses. His logical diagram machine represents four intersecting ellipses, arranged so that each section represents one of the sixteen possible combinations. These sections are arranged so as to fall below their original level when they are to be rejected as inconsistent with the premises. They are held in place by pins, and when required to fall, the appropriate pin must be removed. What corresponds to the key-board is therefore a series of sixteen pins, each of which must be individually manipulated. There is no device by which a number of sections may be moved at once. The machine is therefore merely a more cumbersome diagram. The method involved is also practically limited to problems of four terms, since the intersections made by four ellipses are already complex enough. An extension of this system would, in the words of Venn, be probably distasteful to any but a mathematician.

(3) A third logical machine was constructed by Allan Marquand in 1881 (announced in *Johns Hopkins University Studies in Logic*, 1883, 16; published in *Amer. Acad. Arts and Sci.*, 1885, 303–7). It is based upon his logical diagrams (London, Edinburgh, and Dublin, *Philos. Mag.*, Oct. 1881, 266–70). These consist of large squares, subdivided vertically and horizontally into a series of smaller squares, each of which represents one of the logical combinations. The squares which represent combinations inconsistent with the premises may then be shaded off. In his logical machine the combinations are represented by indicators which are arranged like the squares in his logical diagrams. At the outset the indicators are all pointing in a horizontal direction; the premises are then pressed upon a key-board of eight letter and two operation keys, and the indicators which represent combinations inconsistent with the premises fall to the vertical position.

In 1882 Marquand constructed from an ordinary hotel annunciator another machine in which all the combinations are visible at the outset, and the inconsistent combinations are concealed from view as the premises are

impressed upon the keys. He also had designs made by means of which the same operations could be accomplished by means of electro-magnets.

The characteristic of this machine lies in its simplicity, which may be the better appreciated as the machine is extended for problems involving more than four terms. For problems of ten terms Venn would require a new diagram of complicated form, and 1,024 keys to operate the instrument. Jevons for a ten-term machine would require 10,240 letters for his combinations, and a key-board with forty-four keys. Marquand's machine for ten terms needs only 124 letters and twenty-two keys.

There is a further difference between the machines. Jevons' presents as the conclusion not all the combinations consistent with the premises, but only those which involve the terms of the premises. For example, in a series of premises, he assumes that the only conclusion desired is the relation of the first to the last term in the series. In Venn's and Marquand's machines the inconsistent combinations only are thrown out, and all the combinations consistent with the premises are exhibited as the conclusion. Hence any term or combination of terms may be made the subject of the conclusion.

In 1883 Marquand published an account of a machine for producing syllogistic variations, which he constructed in 1881 (*Johns Hopkins University Studies in Logic*, 1883, 12–5). The two premises and the conclusion of a syllogism are written on three rectangular flaps, which are made so as to revolve on a horizontal axis. The contraposed forms of premises and conclusion are then written on the backs of the flaps. By turning a crank, the eight possible combinations of premises and conclusion are then exhibited to view.

This mechanism could be readily extended so as to exhibit similar variations for arguments involving a larger number of premises or conclusions. Marquand's logical machines are now in the Princeton Psychological Laboratory. (J.M.B.)

Logo-, &c. [Gr. λόγος, discourse, lore]: Ger. *Logo-*; Fr. *logo-*; Ital. *logo-*. Logo- (in combination) refers to the intellectual processes, and often specifically to the process introductory to speech. Thus logopathy has been used to indicate a disorder in the formation of thought for the purpose of speaking. On the other hand, logoneurosis is used as well to refer to general mental affections; while logorrhea refers to the excessive flow of words, a common symptom in cases of mania; and logomania to the form of mania in which this occurs. (J.J.)

Logomachy [Gr., taken from the First Epistle of Paul to Timothy, vi. 4 *νοσῶν περὶ ζητήσεις καὶ λογομαχίας*, doting about questions and strifes of words]: Ger. *Logomachie, Wortstreitigkeit*; Fr. *logomachie*; Ital. *contesa di parole.* A contention (in which it is not essential that two parties should be active) not professedly relating to the use of words and phrases, but in which proper care exercised to make the ideas clear will show the critic, either that there is no important difference between the position attacked and that defended, or if there is, that the argumentation does not relate to such points.

Theology and subjects connected with it, such as the freedom of the will, have been the great theatre of such war. At present it is still kept up in logic; and other branches of philosophy are not entirely freed from it. Disputes about the propriety of modes of speech, however hot and silly they may be, are not logomachy. (C.S.P.)

Logos [Gr.]: Ger. *Logos*; Fr. *Logos*; Ital. *Il verbo.* (1) Reason (q. v.).

(2) The eternal Son of God, in whom the wisdom and power of God are manifested, and who became incarnate in the person of the historic Jesus.

In Greek thought in its earlier stages the Logos is the universal or divine reason of the world. In later Greek thought under theosophic impulses the Logos acquired a quasi personality. It is hypostatized, at least in the thought of Philo of Alexandria, who ascribes to it some mediating functions between God and the world. The Christian idea of the Logos is contained in the prologue to the Gospel of St. John, in which it is identified with the eternal Christ, who became flesh in the person of Jesus Christ. Out of this germ the Christology of the early Church developed, and was embodied in the historic creeds.

Literature: Heinze, Die Lehre vom Logos in d. griechischen Philos. (1872); Zeller, Philos. d. Griechen, iii; Dorner, Hist. of the Devel. of the Doctrine of the Person of Christ. (A.T.O.)

Lombard, Peter. (cir. 1100–63 or 64.) Educated in theology at Bologna, Rheims, and (under Abelard) Paris. Taught theology successfully at Paris, and became bishop of Paris, 1159. For his work *Sententiarum Libri IV*, he received the title 'Magister Sententiarum.'

Lotze, Hermann Rudolf. (1817–81.) Born at Bautzen, Saxony; studied medicine, natural philosophy, and metaphysics at Leipzig, where he became professor of mental philosophy in 1843. Called to Göttingen, 1844, and to Berlin, 1881, where he died soon after. He belongs to the group of philosophers known as 'Real-Idealists,' opposing Hegel on the one hand and materialism on the other hand; and he is still a most potent influence. His philosophy is characterized by subtle criticism of the concepts of physical and mental science. He was also one of the pioneers of physiological psychology.

Love [AS. *lufian*, to love]: Ger. *Liebe*; Fr. *amour*; Ital. *amore*. Dispositional INTEREST (q.v.) of an exclusive kind, having a person for its object, and manifesting itself in the following emotional states: (1) pleasure in the presence of a person or other communion with him, and in the thought of him; (2) pain occasioned by his absence or estrangement; (3) pleasure in his welfare; (4) pain occasioned by injury to him. (G.F.S.–J.M.B.)

The word seems generally to imply exclusive interest in an individual—an interest of such a nature that no other than the particular person loved can satisfy it. There is, however, another meaning. It is possible to say I love Americans, soldiers, or 'the brethren.' It is also possible in ordinary language to use the term in connection with impersonal objects, as when we speak of 'love of truth' or 'love of beauty.' The emotions in which such interests manifest themselves are more or less analogous to those connected with attachment to persons. But the word is most properly applied to personal relations, and other usages may be regarded as derivative and metaphorical. (G.F.S., J.M.B.)

The most important distinctions, of a psychological sort, are those (1) between love which involves the natural affections and that which is independent of them; the former is based upon predispositions of a hereditary sort, as is most strongly instanced in maternal affection. The latter sort of love is extremely complex, seeming to involve the whole range of possible interests in persons—impulsive, sensuous, intellectual, aesthetic, moral. Another distinction (2) is that typified by the difference between the love for persons respectively of the opposite and of the same sex. The former is often called 'romantic' love, and the latter 'fraternal' or 'brotherly' love; and the latter is more akin to the natural affections. Romantic love may exist, however, between persons of the same sex. Romantic love has been the subject of the analysis of novelists, notably of the later 'psychological' school. Psychologists usually agree in recognizing in it at least the mating and the sensuous aesthetic impulse, however they may individually disagree in respect to which of these is more fundamental, if either, and in respect to the other more refined factors which contribute to the dispositions involved. Groos connects it with coyness, by which the mating instinct is regulated. The exclusiveness of the interest is much stronger in romantic love.

In romantic love the conative ingredient is very strongly shown—intruding itself into consciousness—in what is called 'longing' or 'desire' for the loved one, being a condition of extreme restlessness and mental distraction which gives peculiar quality to the pain of absence or estrangement. This is not prominent in other forms of affection or friendship—at least to the same degree. A recent writer has said: 'Friendship is a satisfaction, love is a desire.'

Literature: perhaps the most painstaking analysis is that of BAIN, Emotions and Will (4th ed.); the exclusiveness of the interest involved has been emphasized by ROYCE, The Conception of God, v. Pt. III. vi. See also GROOS, Play of Man, Eng. trans., 252 ff.; STENDHAL, L'Amour (1822); MICHELET, L'Amour (1858); DE ROBERTO, L'Amore (1897). For the psychopathology of love, see KRAFFT-EBING, Psychopathia sexualis (10th ed.). See also most of the textbooks of psychology, and many of the treatises given under EMOTION. Cf. SHYNESS. (J.M.B.)

Love (metaphysical): see NEO-PLATONISM, and MYSTICISM.

Love (in theology). That attribute of the divine nature by virtue of which God rejoices in and conserves the good of his creatures.

Among the divine attributes love holds the place of supremacy, inasmuch as it is an all-comprehending emotional principle, which unites God in his creative and conserving activities with the whole creation. The special love of God for his rational creatures is one of the central doctrines of the Christian theology.

Literature: see ATTRIBUTES (of God). (A.T.O.)

Loyalty (political): see PATRIOTISM.

Lucidity [Lat. *lucidus*, light, clear]: Ger. (1) *Lucidität*, (2) *Hellsichtigkeit*; Fr. *lucidité*; Ital. *lucidità*. (1) In reference to mental

disease: the ability to think clearly and appreciate existing relations. A lucid interval in insanity is thus the throwing off of the delusions and morbid habits of thought incident to the disease, and the resumption of the normal habit. Lucid intervals are common in mania, but must not be confused with the mere remission of paroxysms or the intervals between recurrences of mania. The term is also important in a medico-legal sense.

(2) The alleged power claimed by the 'somnambulists,' the successors to Puysegur, by 'spiritists' and others, of transcending the ordinary powers of the senses, overcoming the ordinary visual limitations, and seeing things at a distance and through opaque mediums. The theory has been revived by Richet and others in the discussion of experiments in THOUGHT-TRANSFERENCE (q. v.). See CLAIRVOYANCE. (J.J.)

Lucretius, Titus Lucretius Carus. (cir. 97–53 B.C.) Little is known as to his life. Roman citizen of noble rank. He may have studied in Athens, becoming familiar with Greek philosophy. His poem, *De rerum Natura*, revised by Cicero, and still extant, is considered the completest exposition of the theories of Epicurus. Cf. EPICUREANISM.

Ludicrous: see COMIC.

Lul, Raimon, or **Lullus, Ramundus,** or **Lully, Raymond,** also **Lullius,** and **Lulli.** (1235–1315.) Indifferently educated, although of an aristocratic Catalonian family, on the island of Majorca. Became grand seneschal at the court of King Jacob of Majorca. In 1266 he was converted to Christianity, sold most of his property, devoted himself for nine years to ascetic practices and the study of Arabic. He formed the plan of converting the Moslems to Christianity by appealing to their higher reason. In 1276 he succeeded in having a college established at Miramar for thirteen Minorite friars, who were to study Arabic and fit themselves for missionary work. To expedite matters he sought a universal and infallible formula or rule, by which doubtful questions of faith could be settled. This came, he believed, as a revelation from God on Mount Randa. He wrote in three languages, his devotional poems in Catalan being of high order. Tried several times to interest the pope in his missionary plans, but failed. He wandered about teaching from place to place, making three unsuccessful efforts in Tunis to convert the Moslems, in the last of which he was martyred.

Lumen (naturale, gratiae, &c.) [Lat.]. Light; e. g. of nature (*naturale*), the natural faculties as affording knowledge, wisdom, &c.; contrasted with light of grace (*gratiae*), the illumination due to divine grace. See LIGHT OF NATURE.

The term is a scholastic and theological one, and is applied also to the various sources of 'light' or 'leading,' as light of faith (*fidei*), of knowledge (*scientiae*). Cf. Eisler, *Wörterb. d. philos. Begriffe*, sub verbo, for extensive citations. (J.M.B.)

Lunacy [Lat. *luna*, the moon]: Ger. *Irrsinn, Mondsucht* (popular); Fr. *folie*; Ital. *pazzia, lunatico* (lunatic, pop.). The term reflects a bygone notion of an intermittent form of insanity affected by the moon. It is used popularly as synonymous with insanity, and is especially prominent in the discussion of the legal relations of insanity. A lunatic is a person who comes under the legal qualifications of insanity.

The law of lunacy, the commissioners in lunacy, lunatic asylum, suggest the use of the term in its general application to insanity. The laws defining lunacy and the proceedings necessary to commit an affected person as a lunatic differ in various countries, but in almost all cases the ability to manage one's own affairs is the important consideration. See INCAPACITY, and INSANITY (and the literature there cited). (J.J.)

Lust [AS. and Ger. *lust*, desire]: Ger. (1) *Gelüst*, (2) *Wollust*; Fr. (1) *convoitise* (covetousness), (2) *impureté*; Ital. (1) *appetiti (bassi)*, (2) *concupiscenza*. (1) Craving for immoderate self-indulgence of any sort.

(2) Restricted in popular usage and in law to inordinate sexual passion.

Usage (1) is that of the theologians, who extend the term to include 'unsanctified' desire for earthly pleasure of any sort; and of ethical writers, who, however, emphasize the lower appetences by the term and so lead to the usage (2). Cf. the New Testament (John viii. 44) for usage (1), and the 'Sermon on the Mount' (Matt. v. 28) for usage (2). (J.M.B.)

Lustre [Lat. *lucere*, to shine, through Fr.]: Ger. *Glanz*; Fr. *lustre*; Ital. *lustro*. 'We term a surface lustrous when the reflection-image which it gives is intrinsically exceedingly indistinct, or when the clear apprehension of it is prevented by irregularities of the reflecting surface. For the most part the two conditions are found together' (Wundt, *Physiol. Psychol.*, 4th ed., ii. 205).

Two illusions of lustre may be noticed: (1) Binocular. A sheen or polish arises when one half of the stereoscopic field is white and the other black or coloured. This is due to the associative transference of the conditions of objective lustre to the field seen. (2) Monocular. A similar effect can be obtained monocularly by Lambert's method of Colour Mixture (q. v.).

Literature: Sanford, Course in Exper. Psychol., expt. 166; Kirschmann, Philos. Stud., xi. 147 (to whom metallic lustre depends on the parallax of indirect vision); Hering, in Hermann's Handb. d. Physiol., III. i. 575; Aubert, Physiol. Optik, 553; Helmholtz, Physiol. Optik (2nd ed.), 932–6, 944. Stereoscopic lustre was discovered by Dove, Berl. Akad. Berichte (1851), 246; and Pogg. Ann. (1851), lxxxiii. 480. (E.B.T.)

Luther, Martin. (1483–1546.) Born at Eisleben, Saxony. Educated at the schools in Magdeburg and Eisenach and at the University at Erfurt. Began the study of law, but changed his course, and in 1505 entered an Augustinian monastery. Ordained priest in 1507. Professor of philosophy at Wittenberg, 1508; at Erfurt, 1509; professor of theology at Wittenberg, 1510; sent to Rome (1510) on business for the Augustinian order; provincial vicar of Meissen and Thuringia, 1515. He first preached against the sale of indulgences, and in 1517 nailed his famous ninety-five theses on the door of the castle church at Wittenberg. Tried by the Diet of Augsburg, 1518; held his disputation at Leipzig with Eck, 1519; excommunicated, and burned the papal bull before his students at Wittenberg, 1520; refused to recant before the Emperor Charles V, and was seized by friends in disguise and carried to Wartburg Castle for security, 1521; returned to Wittenberg in 1522, and resumed his duties in the University. See Lutheranism, and Reformation.

Lutheranism [Lutheran, an adherent of Luther]: Ger. *Lutherthum*; Fr. *Luthéranisme*; Ital. *Luteranismo*. The system of the Lutheran Church, embracing a form of government and worship, and a confession in which the doctrines of justification by faith, supreme authority of Scriptures, total depravity and inability of man, vicarious and unlimited atonement, and real presence of Christ in the Eucharist, are essential features.

Luther stood for the reform of abuses, an open and authoritative Bible, freedom of private judgment, and justification by faith without penance. The Lutheran Church, which is the oldest and largest of the Reformed communions, adopts as its symbols the Apostles', Nicene, and Athanasian Creeds, the Augsburg Confession, which contains its charter, together with Luther's catechisms and various modifications of the Augsburg Symbol. Holding many points in common with Calvinism, it differs from that system in less insistence on the divine sovereignty and the decrees, in the denial of limited atonement, in the doctrine of the real presence of Christ in the Eucharist, and in the greater emphasis it places on the historic evolution of the symbols of faith.

Literature: F. C. Bauer, Lehrb. d. Dogmatengesch. (2nd ed., 1857); Kraut, Conservative Reform (1871); Kahnis, Christenthum u. Lutherthum (1871); H. F. Jacobs, in Johnson's Univl. Cyc.; Schaff, in the Schaff-Herzog Cyc. of Eccles. Lit. (A.T.O.)

Luxury [Lat. *luxus*]: Ger. *Luxus*; Fr. *luxe*; Ital. *lusso*. Commodities which do not produce, in those who use them, economic efficiency proportional to their cost.

A thing is a luxury if it involves a using up of accumulated power without permanent equivalent for the future. We must beware of defining luxury in terms of pleasure. The more real pleasure a thing gives, the less likelihood is there that it can be described as a luxury; for the presumption is that it will tend to increase the productive power of those who enjoy it. A pleasure becomes a luxury (1) when it is harmful to the physical or moral constitution of those who enjoy it; (2) when it involves a waste of capital or of labour power beyond what the recipient of the pleasure is stimulated by it to replace. (A.T.H.)

Lymph [Lat. *lympha*, clear water]: Ger. *Lymphe*; Fr. *lymphe*; Ital. *linfa*. The fluid portion of the blood which has filtered through the walls of the blood-vessels, has nourished the various tissue elements, received from them their waste products, and which is collected in lymphatic vessels and finally returned to the blood.

In addition to fluid constituents, lymph contains colourless lymph corpuscles which have wandered (*diapedesis*) through the walls of the blood-vessels, and which are also added to the lymph stream by numerous lymph nodules located in the course of the lymphatic vessels. Lymph is thus to be distinguished from plasma, which is the fluid portion of circulating or freshly shed blood, and also from serum, which is the fluid portion of coagulated blood. (C.F.H.)

M

M. The logical symbol for the MIDDLE TERM (q. v.). (J.M.B.)

m. v. Symbol for Mean Variation. See ERRORS OF OBSERVATION. (J.M.B.)

McCosh, James. (1811–95.) Educated at Glasgow and Edinburgh; ordained minister of the Church of Scotland, 1835; took part in the organization of the Free Church, and became professor of logic and metaphysics in Queen's College, Belfast, 1843; president of the College of New Jersey at Princeton, 1868; resigned, 1888. He belonged to the Scottish school of philosophers. Cf. NATURAL REALISM.

Mackintosh, Sir James. (1765–1832.) Educated at King's College, Aberdeen, and at Edinburgh. Called to the bar at Lincoln's Inn, 1795; knighted in 1803; recorder of Bombay, 1804–6; judge of Vice-admiralty, 1806–11; returned to England, 1811, and entered Parliament, 1813; professor of law and general politics in Haileybury College, 1818–24; a commissioner of Indian affairs, 1830.

Macrocosm (and **Microcosm**) [Gr. *μακρός*, great, and *μικρός*, small, + *κόσμος*, universe]: Ger. *Makro-*, *Mikrokosmus*; Fr. *macro-*, *microcosme*; Ital. *macro-*, *microcosmo*. The great world, macrocosm, applied to the universe, when contrasted with man, the microcosm or little world, the correlation of the two terms being at the same time intended to express an analogy between them.

The idea of such an analogy is present in the Aristotelian philosophy, and was developed by the Stoics in connection with their doctrine of *πνεῦμα*, the divine reason, which is also the warm vital breath that animates and purposively pervades the universe. As the world-soul to the world, so is the individual soul (which is a part of the universal soul) related to the body; and to the universal reason corresponds the rational or ruling part (*τὸ ἡγεμονικόν*) of the individual soul. The doctrine played a great part in the speculations of the Renaissance thinkers, e.g. in Bruno, Paracelsus, Weigel, and Böhme. In man's nature is to be found the sum or 'quintessence' of the cosmical forces. Because he unites in his body the finest essence of all material things, man is able to understand the material world. As an intellectual being, he is at the same time of 'sidereal' origin, and therefore competent to understand the world of intellectual forms, while a 'spark' of the divine, infused into his nature, enables him to become conscious of God, whose image he is. Thus man knows the universe of being only so far as he is the universe, or contains within himself the principles of all that is. In Bruno's system, not man alone, but every monad or individual substance is an immediate manifestation of the infinite life, which thus individualizes and concentrates itself everywhere throughout the universe. Each monad is thus a 'mirror' or microcosm of the all. In the system of Leibnitz, the relation between the individual monad and the universe is similarly expressed. The idea that like is known by like is, of course, as old as Empedocles, of whose theory of perception it forms the central doctrine. Cf. MONAD. (A.S.P.P.)

Literature: see the citations in EISLER, Wörterb. d. philos. Begriffe, 'Mikrokosmus'; also FLEMING-CALDERWOOD, Vocab. of Philos., 'Microcosm.' LOTZE used the term as title of his general work Microcosmus. (J.M.B.)

Madness (and **Madman**) [Sansk. *mod*, to be drunk or mad]: Ger. *Manie* (*Toller*); Fr. *folie* (*fou*); Ital. *follia*, *pazzia* (*pazzo*, *matto*). A synonym of insanity, referring particularly to the disorder of reason or the uncontrollable emotion frequently characteristic

of the insane state. Madman is also used as a synonym of lunatic. See INSANITY AND SANITY, MANIA, and FUROR. (J.J.)

Magic (1) and (2) **Divination** [Gr. μαγική, magic, from Μάγοι, the priests of the Medes and Persians, and Lat. *divinare*, to foresee]: Ger. (1) *Magie, Zauberei*, (2) *Eingebung*; Fr. (1) *magie*, (2) *divination*; Ital. (1) *magia*, (2) *divinazione*. (1) A varied and extensive group of practices which appeal to supernal or supernatural agencies and illustrate SUPERSTITION (q. v.) reduced to practice.

Magical practices are found in almost all stages of primitive culture, and have a long and significant history in the chain of civilizations leading up to the present. While magical powers were in part derived from a deity or spirit, and were exercised like those of possession, a larger and more distinctive group of magical practices depended upon the discovery and interpretation of mystic correspondences which were occult or hidden from the popular ken. By the exertion of the will, by the careful observation of minute ceremonial rules, by the solemn enunciation of formulas and words, by the interpretation of the flight of birds or of the entrails of a beast, by casting dice and lots, by seeking the significance of personal peculiarities in a system of correspondences, and by a host of similar performances, the shaman or medicine man, the sorcerer or astrologer, the fortune-teller or exorcizer, tries to interpret the past and to influence the future, to control the forces of nature, to remove disease and evil, to bring on health and prosperity. Such proceedings are never wholly fanciful, but involve some far-fetched or misleading analogy, vague enough to permit of the adjustment of details to special cases, and yet imposing enough to impress the uncultured mind. In such practices are found some scraps of knowledge and logical tendencies which, after ages of tortuous progress, have often become the starting-points of true scientific knowledge. For the formulation of such procedure under psychological principles, based on ethnology, see Hirn as cited below.

The study of magic in primitive civilizations contributes much to the comprehension of the mental processes in undeveloped man; for it shows that in the attempt to regulate the actions of his own life, or to interpret the phenomena of nature about him, the appeal to magical hidden relations was the natural, normal process. Omens and portents, charms and fetiches, rites and offerings, divination and sorcery were the expressions of a desire for security and for wisdom. Interpretation based upon signs, omens, &c., is called prognosis.

The history of magic in written records can only be referred to in this connection as a vast storehouse for the study of the action of the human mind under impulses and tendencies in large part inhibited or transformed, but not without effect on current beliefs. With the growth of the art of writing and the beginnings of natural science, elaborate possibilities for occult rites and systems were laid open, which were utilized alike by Assyrian or Egyptian priests, and by mediaeval astrologers.

The practice of magic or sorcery frequently came into disrepute, and was prohibited by law or even punishable by death. The distinction between 'black magic' and 'white magic' grew up as the result of such interdiction. White magic included the production of illusions and entertaining applications of physical principles, and thus became the antecedent of modern legerdemain.

(2) Divination is that form of magic which utilizes knowledge derived from some superhuman source, the knowledge being acquired by magical means.

Artificial divination is a widespread practice most largely represented in the culture stages above the lowest, though by no means absent in the lowest stages. The methods of divination and augury are almost unlimited, many of them depending on the interpretation by analogy or symbolism of the results of chance or of accidental details. Amongst natural forms of divination may be mentioned the appearances and cries of animals, dreams, configuration of hand and face, inspection of entrails, the fanciful appearance of flames of fire, or smoke, or ashes; the interpretation of charms, names and marks on the body, and so on. Over fifty terms ending in '-mancy' (divination) are cited in the literature of this topic. Of special and somewhat artificial devices invented for the purposes of divination, may be mentioned the setting up of sticks, to see whether they stand or fall, the spinning of a teetotum or similar contrivance, the throwing of dice and cards, the melting of lead or wax, pricking for texts in the Bible, and the divining rod. The last has had a specially interesting history, for which consult Barrett, *Proc. Soc. Psych. Res.*, Oct., 1900.

Of all the systems of divination, astrology, which depends upon the prediction of the

fortunes of the individual on the basis of the position of the celestial bodies at the moment of birth, has been the most elaborate and influential, and may be studied for the abundant illustrations which it offers of the mental attitude under which the processes of divination flourish. (J.J.)

From the standpoint of philosophy, it may be said that there is an element common to these various practices and superstitions by the presence of which they may be fitly described as magic. This element may be explained or set forth in detail, it can hardly be defined. The essential, or permanent, element common to all 'universes' of human experience of this sort has been most clearly elucidated by Bastian: 'Sorcery, or, in its higher expression, magic, marks the first dawning consciousness of mutual connection throughout nature, in which man, feeling himself part of the whole, thinks himself able to interfere for his own wishes or needs. So long as religion fills the whole horizon of culture, the vague groping of magic contains the first experiments which lead to the results of exact science. Magic is the physics of mankind in the state of nature. It rests on the beginning of induction, which remains without result only because in its imperfect judgments by analogy it raises the *post hoc* to the *propter hoc*.' A similar explanation is wrought out by F. B. Jevons (cited below, chap. iv). Magic, in other words, grows out of a theory of causation. And the business of philosophy is to set forth the factors in this theory, no matter how they, and other results or accompaniments, may alter, as they do alter in marvellous ways, throughout the numerous stages varying between lowest savagery, Persian and Babylonian culture, mediaeval prejudice, and modern superstition. (R.M.W.)

Literature: Jevons, Introd. to the Hist. of Religion; Bastian, Rechtsalterthümer; Waitz and Gerland, Anthropologie d. Naturvölker; B. Spencer, Australian Aborigines; Tylor, Primitive Culture, and Early Hist. of Mankind; Ellis, Polynesian Researches; Callaway, Religious Syst. of the Amazulu; Lenormant, Magie chez les Chaldéens, and Divination chez les Chaldéens; Sayce, Hibbert Lects.; King, Babylonian Magic and Sorcery; Robertson Smith, Religion of the Semites; Weber and Schnedermann, Jüdische Theol.; Eisenmenger, Entdecktes Judenth.; Leclerq, Hist. de la Divination dans l'Antiquité; Brecher, Das Transcendentale, Magie u. magische Heilarten im Talmud; Rhode, Psyche; Farnell, Cults of the Greek States; Frazer, The Golden Bough (2nd ed., 1900); Cicero, De Divinatione; Aust, Die Religion d. Römer; Maury, La Magie et l'Astrol.; Brand, Pop. Antiq.; Pettigrew, Superstitions of Med. and Surg.; Menius, De Exorcismo. For mediaeval magic, especially in its ecclesiastical aspects, see Herzog's Real-Encyc., art. Exorcismus. On the subject as a whole, Tylor, Encyc. Brit., art. Magic; Blavatsky, Isis unveiled (an accredited manual of contemporary superstition); White, Hist. of the Warfare of Sci. with Theol. (1897), chap. xii and elsewhere; Lehmann, Aberglaube u. Zauberei (1898); Rydberg, Magic of the Middle Ages (trans., 1879); Chevreul, La Baguette divinatoire (1884); Figuier, Le Mystère de la Science, 573–644; Ellworth, The Evil Eye (1895); P. Christian, Hist. de la Magie; Lang, The Making of Religion; de la Saussaye, Lehrb. d. Religionsgesch.; C. Meyer, Der Aberglaube des Mittelalters (1884); Baudi di Vesme, Storia dello Spiritismo (1897–8); Berenger-Feraud, Superstitions et Survivances; Regnault, La Sorcellerie (1897); Skeat, Malay Magic (1900); Hirn, Origins of Art (1900), chap. xx. (R.M.W.–J.J.–L.M.)

Magnetic Stopper: see Laboratory and Apparatus, III, B, (*a*), (8).

Magnetism: Ger. *Magnetismus*; Fr. *magnétisme*; Ital. *magnetismo*. See Magnetic Energy, under Energy.

Magnitude (extensive) [Lat. *magnitudo*, bulk, size]: Ger. *Grösse*; Fr. *grandeur*; Ital. *grandezza*. That which has dimensions or extension, as a line, a surface, or a solid; called also a geometric magnitude. In other branches of mathematics than geometry the word is replaced by Quantity (q. v.). (S.N.)

Magnitude (intensive): see Quantity.

Maimon, Salomon. (1753–1800.) A Jewish rabbi and philosopher, born in Lithuania.

Maimonides (**Moses ben Maimon** in Hebrew; **Abu Imram Musa ibn Maimun ibn Abdallah** in Arabic). (1131–1204.) Known among Christian writers as R. Moyses. Early studied the Bible and the Talmud, guided by his father; also mathematics, astronomy, and medicine. Born at Cordova, he, with his family, was banished for political and religious reasons. In 1159 they were in Fez, in 1165 in St. Jean d'Acre. He settled in Cairo, followed the jeweller's trade, and became famous for learning and medical skill.

Major [Lat. *maior*, greater]: Ger. *Dur*; Fr. *majeur*; Ital. *maggiore*. One of the two fundamental scales or keys of modern music. Expressed in 'whole tones,' it runs: 1, 1, 1–2, 1, 1, 1, 1–2. Cf. MINOR, and TRIAD.

This is the natural diatonic series, represented by the series of musical tones starting from C. It corresponds to the Greek Lydian, and the ecclesiastical Tonic. Cf. Helmholtz, *Sensations of Tone*, 274.

A major interval is that form of the interval which is greater by a semitone than its corresponding minor. A major chord is a chord containing the major third above the fundamental. A major tone is one the vibration ratio of which is 8 : 9, as contrasted with the minor 9 : 10. Cf. Parry, in *Grove's Dict. of Music*, ii. 200. (E.B.T.)

Major and **Minor** (extreme, term, premise, *satz*, &c., in logic): Ger. *Ober-* and *Unter-* (*Begriff*, &c.); Fr. *majeur* and *mineur*; Ital. *maggiore* and *minore*. The subject and predicate of the conclusion of a syllogism are called the extremes (*τὰ ἄκρα*, by Aristotle), because they are only brought together by the agency of the third term, called, on that account, the middle term (*ὁ μέσος ὅρος*, Aristotle). Of the two extremes, the one that is the predicate of the conclusion is called the major extreme (*τὸ μεῖζον ἄκρον*, Aristotle), because in a universal affirmative proposition (the typical formal proposition) its breadth is the greater, while the subject of the conclusion is the minor extreme (*τὸ ἔλαττον ἄκρον*, Aristotle).

Whether the expressions major term and minor term, for the major and minor extremes, are grammatically accurate or not, they are consecrated by usage through the scholastic period. The major and minor premises are respectively those which contain the major and minor extremes. Aristotle (I. *Anal. Pr.*, ix) calls the former *ἡ πρὸς τὸ μεῖζον ἄκρον πρότασις*, 'the proposition about the major extreme.' (C.S.P.)

Majority (in law): see INFANT.

Make-believe: Ger. (1) *Vortäuschen, bewusster Schein*; Fr. (1) *feinte, faux semblant*; Ital. (1) *finzione*. (1) The indulgence in SEMBLANCE (q. v.) with consciousness of, or for the sake of, the effect upon another.

As is pointed out under semblance, that state of mind may involve self-illusion or not. In the higher forms of semblance, there is the keeping up of the artificial situation without self-illusion, but with direct reference to the effect upon an observer, a more or less explicit attempt to make another believe, and so to sham. It is recommended that the term make-believe be confined to this more particular aspect of the consciousness of semblance. The term sham—especially the verbal forms (e.g. shamming)—may well be used as a synonym. The shamming of disease and the symptomatic forms of deception in certain diseases, known as malingering, illustrate make-believe.

(2) The consciousness of unreality attaching to certain mental constructions, notably those of play and art. See SEMBLANCE (also for foreign equivalents), which is preferable in this broad meaning; and cf. ART AND ART THEORIES.

(3) Used in biology for the attitudes of feigning (e.g. the opossum's feigning death), a form of SEMBLANCE (q. v.) which is largely instinctive, and probably only slightly, if at all, conscious. (J.M.B., G.F.S.)

Male [Lat. *masculus*]: Ger. *männlich*; Fr. *mâle*; Ital. *maschio*. The primary meaning refers to the individual capable of producing spermatozoa or the homologous elements in the lower animals or in plants. By extension it is applied (1) to characteristics of a male individual, especially such as are sexually distinctive; (2) to the spermatozoa or other sexual elements produced by a male individual or the male gland of an hermaphrodite. Cf. SEX. (C.S.M.)

Malebranche, Nicolas. (1638–1715.) Born of a wealthy and respectable family. He was too poor in health to attend school. Studied theology at the Sorbonne. Read Descartes in 1664, and devoted himself to philosophy.

Malevolence (or **Malice**) [Lat. *malevolentia*]: Ger. *Bosheit, Böswilligkeit*; Fr. *malice, méchanceté*; Ital. *malevolenza, cattiveria*. The disposition to bring pain or misery to another or to take pleasure in it.

The nature of malevolence and the possibility of disinterested malevolence have been discussed by the English moralists. Hutcheson describes 'disinterested malice or delight in the misery of others' as the highest pitch of what we count vicious; and, according to Butler, 'the utmost possible depravity which we can in imagination conceive is that of disinterested cruelty.' At the same time, both doubt the possibility of its being genuinely disinterested. 'Human nature,' says Hutcheson, 'seems scarce capable of malicious disinterested hatred, or a sedate delight in the misery of others'; and Butler holds that 'as there is no such thing as self-hatred, so neither is there any such thing as ill-will in

one man towards another, emulation and resentment being away.' By Bentham the 'pleasures of malevolence' are recognized as motives corresponding with the 'pleasures of benevolence.' Cf. MALICE (in law). (W.R.S.)

It is interesting to ask whether there is not an aesthetic factor in malevolence, as there is in most benevolence and sympathy. There can be no doubt that many of the actions ordinarily ascribed to malice are better explained from the elements of play and of the comic involved in the production of grotesque and unusual situations. The aesthetic motive described by recent writers (e.g. Groos) as 'pleasure in being a cause' enters into much that passes for malice, as in painful practical jokes, cruel wit, &c. Furthermore, the very fact that the pain—and in cases of sympathy, the pleasure—is in another, makes it possible to take a contemplative attitude towards it as towards the element of semblance (Schein), which in the aesthetic psychosis is contrasted with actual personal experience. It may be the writhing, not the pain, of the pinned-down insect that interests. Delight in the repulsive seems to have one element, at least, of aesthetic contemplation—disinterestedness—at its purest; and it is quite possible that disinterested malice springs from a similar root. It is interesting to note that we often take pleasure—and it is quasi-aesthetic—in certain of our own pains (cf. Hirn, *Origins of Art*, chap. v). (J.M.B.)

Literature: HUTCHESON, Inquiry, §§ 1 and 2; BUTLER, Sermons, pref. and i; BENTHAM, Princ. of Mor. and Legisl., chap. x; BAIN, Emotions and Will (3rd ed.), 66, 187 ff. (W.R.S.)

Malfeasance [Fr. *malfaisance*; from *mal*, evil, + *faire*, to do]: Ger. *Missethat*, *Übelthat* (that which is wrongfully done); Fr. *méfait*, *méchanceté* (that which is wrongfully done); Ital. *misfatto*. Doing wrongfully what could not be done rightfully; as distinguished from doing wrongfully what could be done rightfully, which is termed *misfeasance*, and from *non-feasance*, which is not doing what one has undertaken to do. Malfeasance, however, is often used inaccurately for misfeasance.

Malfaisance, in French, signifies a disposition to do ill to another; not the doing of ill. (S.E.B.)

Malice: see MALEVOLENCE.

Malice (in law): Ger. *Bosheit*; Fr. *malice*; Ital. *malizia*. The evil intent to do a wrongful act injurious to another. By a legal fiction, such an intent is sometimes imputed where it did not exist, and is then termed malice in law, as distinguished from malice in fact (see Markby, *Elements of Law*, §§ 686, 687).

Where one causes another to be prosecuted for an alleged crime, without reasonable cause, and the result is an acquittal, he is liable for a 'malicious prosecution,' and malice is implied, though there was none in fact. Malice is a necessary ingredient of the crime of murder, being styled in that connection malice aforethought or malice prepense. (S.E.B.)

Malthus' Law: Ger. *Malthus'sches Gesetz*; Fr. *loi de Malthus*; Ital. *legge di Malthus*. An alleged tendency of population to increase in geometrical progression while subsistence increases only in arithmetical progression. The former therefore tends to outstrip the latter, until the inadequacy of food supply brings disease and reduces numbers within the necessary limits. The principle is known as MALTHUSIANISM.

In the first edition (1798) of his *Essay on the Principles of Population*, Malthus stated the law substantially as here given. In subsequent editions he laid more relative stress on the possibility of 'preventive checks,' which should avoid the fatal geometrical increase, and thus preclude the need for the positive check of famine and disease. Modern critics have sometimes said that this amounts to an abandonment of the whole position; for these preventive checks, they claim, are so far automatic that the whole geometrical-progression theory falls to the ground. Other critics insist that the limitation of the food supply is not nearly so rigid as Malthus assumed. The principle of Malthus suggested to both Darwin and Wallace the 'struggle for EXISTENCE' (q. v.) in the animal world, upon which the law of NATURAL SELECTION (q.v.) was based (see Poulton, *Charles Darwin*, 46, 88, 89; and cf. EXCESS, and PRODIGALITY OF NATURE).

Literature: BONAR, Malthus and his Work; K. PEARSON, The Chances of Death, i. (A.T.H.)

Malthusianism: see MALTHUS' LAW.

Malum (in law) [Lat.]. *Malum prohibitum*: an act wrong because prohibited by positive law, though not necessarily bad in the view of moral reason or natural law. *Malum in se*: an act which is wrong in the view of reason or natural law. (S.E.B.)

Mammal [Lat. *mammalis*]: Ger. *Säugethier*; Fr. *mammifère*; Ital. *mammifero*. One of the Mammalia, the highest class of vertebrates, containing all the animals with milk glands (mammae) for the nourishment of the young during a variable period after birth.

The mammals are all air-breathing, warm-blooded animals, with a more or less hairy covering, a four-chambered heart, a sinistral aorta, and a complete diaphragm separating the pleural and abdominal cavities. The four last characteristics distinguish them from all other vertebrates, the four-chambered heart of birds being dextral in plan.

The blood of adult mammals contains non-nucleated red corpuscles of smaller size than the red corpuscles of other vertebrates, which are invariably nucleated throughout life. The class is subdivided into three sub-classes: (1) the monotremes, of which the duck-bill or ornithorhynchus is the best-known representative; (2) the marsupials, of which the opossum and kangaroo are the most familiar types; and (3) the placental mammals, which include the majority of living forms, and with which man is classed in the order of PRIMATES (q.v.). The habit of nourishing the young after birth has been a chief factor in the evolution of family life, and is therefore intimately correlated with the development of the brain, the size and complexity of which is, from the biological standpoint, by far the most important characteristic of the Mammalia. The phylogenetic origin of the Mammalia has not been determined, but it seems probable that they arose from forms belonging to the amphibian type, although many authorities maintain that their immediate ancestors were reptilian. The earliest unquestionable mammalian fossils have been found in the Jurassic strata.

Literature: FLOWER and LYDDEKER, Mammals; FLOWER, Osteol. of the Mammalia; PARKER and HASWELL, Zoology, ii; LECHE, Säugethiere, in Bronn's Thierreich; see also the Roy. Nat. Hist.; BREHM, Thierleben. On the evolution of the mammals: WIEDERSHEIM, Der Mensch; HUBRECHT, Princeton Lectures; HAECKEL, System. Phylogenie; the Proceedings and reports in Nature of the Int. Zool. Cong. (1897) discussion on the origin of mammals. (C.S.M.)

Man [AS. *man*]: Ger. *Mensch*; Fr. *homme*; Ital. *uomo*. See MANKIND, ANTHROPOID, ANTHROPOLOGY, PSYCHOLOGY, EVOLUTION, SEXUAL CHARACTERS.

Man (doctrine of, in theology): see ANTHROPOLOGY (theological).

Manes (or **Manichaeus**). (cir. 216–cir. 277 A.D.) Appeared in Babylon (242 A.D.) as a religious teacher. Being unsuccessful there he spent his life wandering. Like the Gnostics, he combined into a world conception elements taken from various sources. In place of Jewish monotheism he took Persian dualism as a foundation for MANICHAEISM (q.v.).

Mania [Gr. *μανία*, madness]: Ger. *Manie*; Fr. *manie*; Ital. *mania*. Mental disease involving irresistible and uncontrollable or uncontrolled habit, desire, or craving, with unreasonable or inadequate motives. In psychiatry it is also used symptomatically—to designate certain groups of symptoms.

I. Symptomatic usage. All the phases of general excitement bearing the feature of lack of control are loosely called mania, and when very marked, frenzy. One symptom-complex, which is frequently called mania, although there is no general excitement, and which presents imperative or dominant ideas or habits of conduct, is considered in the article MONOMANIA. True general maniacal excitement occurs in several well-distinguished forms:—

(1) As delirium (delirious mania): implying a maniacal delirium without any of the known somatic foundations for delirium, such as acute typhoid, acute articular rheumatism, pneumonia, grippe, &c.; but sometimes following these diseases or lasting longer than the fever, or coming on after profound exhaustion (collapse delirium) or without any adequate cause: all these forms of excitement are marked by hallucinations, confusion, and disorientation, and often violent raving. Unless exhaustion, injuries, or intercurrent diseases cause death, a favourable course is the rule. It is not always easy to distinguish this form from other delirious states—phases of KATATONIA (q.v.), dementia praecox, manic-depressive insanity, &c.

(2) As an episode of the manic-depressive psychoses (Kraepelin): a typical condition of uncontrollable motor excitement, feeling of strength and well-being, and exhilaration, together with a characteristic flight of ideas and disorder of the stream of thought, with frequent rhyming and inability to keep to one topic or to keep in mind a true picture of the actual state of affairs, with great distractability and irritability of emotional tone, with isolated delusions and (rarely) hallucinations. The untiring activity of the patient usually appears quite spontaneous, though often poorly planned and rapidly shifting; it is varied, rich in all sorts of whims, and, although frequently theatrical, free from senseless stereotypy. The attack is frequently ushered in by depression; and occasionally excitement and depression vary in irregular or

regular intervals, every other day or month, or with the seasons, or after intervals of normal health. The excitement of these forms is so characteristic that the term manic is exclusively applied to it in distinction from the general term maniacal, used for all forms of excitement. For slight forms the term hypomania is used.

(3) As the onset of dementia praecox (hebephrenia or katatonia): the excited phases of the processes of deterioration of Kraepelin. This type is devoid of many of the expansive features of the manic excitement, and is characterized by monotonous, stereotyped manners, strained or forced actions, impulsive outbreaks, silly attitude, and often absurd delusions, frequently of a sexual or religious trend. Cataleptic episodes, hallucinations (God urging the patient to take certain attitudes, not to eat, &c.), and delusions of mysterious influences are quite common; with it all, the patient's mind is often remarkably clear.

(4) As the excitement of general paralysis: often difficult to recognize unless the manifestations or subject matter of the excitement become very absurd, as in MEGALOMANIA (q.v.), and the somatic symptoms (disorder of speech, &c.) are obvious.

(5) As a form of alcoholic insanity: protracted delirium tremens, with the typical hallucinations (snakes, small animals, the devil, &c.), with more or less marked fear; or alcoholic delusional insanity, with or without hallucinations of hearing, centring about persecution, jealousy, &c.

(6) As senile mania: episodes of excitement in senility, often merely states of confusion and bewilderment, or restlessness over delusions concerning property, &c.

(7) As episodes following epileptic attacks, or taking the place of epileptic attacks: equivalents of the characters of acute frenzy.

(8) Many statistics include as chronic mania excited cases of dementia or paranoic conditions.

II. As a name for real diseases or PSYCHOSES (q.v.) the use varies extremely. Those who classify the forms of insanity merely from the point of view of exaltation, depression, and intellectual disorders, remain on purely symptomatic ground and use in a descriptive and retrospective way, without any further discrimination, the expressions acute, subacute, recurrent and chronic mania, according to the form of onset, duration, and course, including all the above types with the exception of the alcoholic, paralytic, epileptic, and senile forms. Kraepelin has made it extremely probable that the periodic or recurrent manic attacks, varying with attacks of depression, and described under (2), form a characteristic disease-entity, the manic-depressive insanity, distinct from the processes of deterioration. This form rarely occurs once only, but usually recurs, or alternates with depression with varying intervals of the normal condition, and the patients rarely become permanently demented. Even after a large number of attacks complete recovery is possible. Such facts suggest the view that manic states are merely an expression of an as yet unknown disease-process, which may likewise express itself as an attack of melancholia, or any other equivalent of manic-depressive insanity, just as a convulsion or some equivalent state is an expression of epilepsy. The types included in this disease-entity are the manic forms, certain semi-delirious ones, certain stuporous and depressed ones, and certain paranoic episodes and mixed forms. For the other forms of excitement the term mania had better be avoided.

Interesting psychophysical experiments exist on the peculiarities of association, writing, and reaction-times, during mania.

Literature: MENDEL, Die Manie (1881); KRAEPELIN, Psychiatrie (1899), ii. 359–425, and Das manisch-depressive Irresein; O. HINRICKSON, Statistischer Beitrag zur Frage nach der Häufigkeit der einfachen acuten Manie im Verhältniss zu den periodischen Formen, Diss. Zürich (1897); ASCHAFFENBURG, Experimentelle Studien über Associationen, in Kraepelin's Psychol. Arb., i, ii; GROSS, ibid., ii. 485–567; CONOLLY, Mania, in Tuke's Dict. of Psychol. Med.; MACPHERSON, Mania and Melancholia, J. of Ment. Sci. (1891); W. WEYGANDT, Über die Mischzustände des manisch-depressiven Irreseins (München, 1899); PAHL, Ueber Häufigkeit und Verlauf der Manie nach den Beobachtungen in der psychiatrischen Klinik zu Freiburg i. B. in den Jahren 1887–95, Diss. Freiburg (1897); ERP TAALMAN KIP, Acute Manie, Allg. Zeitsch. f. Psychiat., liv. 119 (1897). (A.M.)

Manichaeism: Ger. *Manichäismus*; Fr. *manichéisme*; Ital. *manicheismo*. The doctrine of MANES (q. v.). A dualistic system in which two co-ordinate principles of good and evil, symbolized by light and darkness, are represented as engaging in an eternal conflict in the world and in the nature of man; the struggle in man's nature taking the form of

a contest between flesh and spirit, in which the triumph of spirit is to be secured by the practice of a rigorous discipline.

The system of Manes was a modification of the old Persian dualism, the modifying elements being derived from Buddhism and Syrian Gnosticism, with some ideas borrowed from Christianity. While the motive of it was religious, it aimed rather at knowledge than moral purity, and was essentially a form of gnosis. It had a wide following, and powerfully influenced some of the greatest thinkers of the time, notably St. Augustine, who continued under its influence for several years, but finally rejected it and became its most uncompromising foe. Most of the essential features of Manichaeism are found in the older system of Zoroaster.

Literature: F. C. Bauer, Manichäisches Religionssystem; Mosheim's and Geisler's Eccles. Histories; McClintock and Strong, Schaff-Herzog Cyc. of Eccles. Lit. (A.T.O.)

Manifestation (in theology) [Lat. *manifestatio*]: Ger. *Offenbarung*; Fr. *manifestation*; Ital. *manifestazione*. The self-revelation of the Deity to man, in and through nature or consciousness, by ordinary or superordinary agencies.

The term is used more especially of God's revelation of his nature and will in his Son Jesus Christ, and in the work of the Holy Spirit; also in the Holy Scriptures, which are a revelation of his will, according to Christian teaching.

Literature: see Revelation. (A.T.O.)

Manifoldness (or **Assemblage**): see Mathematics.

Mankind [ME. *mankinde*]: Ger. *Menschheit*; Fr. *homme, humanité*; Ital. *genere umano, umanità*. The human race considered collectively.

The study of mankind has led to the formulation of the general science of Anthropology (q.v.), while at the same time other sciences with other primary purposes yield much valuable knowledge concerning man, his position in nature, and his occupations, endowments, and history. The specific study of the races of mankind becomes the purpose of Ethnology and Ethnography (q.v.). See also Race. Many important anthropological and ethnological works bear the title 'History of Mankind'; such as that by Ratzel (3 vols., trans. from 2nd ed., 1896–8). The term 'Natural History of Man' (e.g. the works of Prichard, 2 vols., 4th ed., 1855; Wood, 1868–70, edited by Kingsley, 1885) is used in the same sense. The mental and moral life of mankind is treated by the sciences of Psychology, Ethics, History, Sociology, &c. (see those terms). (J.J.)

Mansel, Henry Longueville. (1820–71.) Educated at Merchant Taylors' School and at St. John's College, Oxford. He was an Oxford fellow in 1842; ordained priest in the Anglican Church in 1845; reader in moral and metaphysical philosophy, Oxford; Bampton Lecturer, 1858; Waynflete professor of philosophy, 1859; Regius professor of ecclesiastical history and canon of Christ Church, 1867; dean of St. Paul's, 1868. He was born at Cosgrove, Northamptonshire, and died at London, England.

Many: see One and Many, and cf. Number (different articles).

Marcus Aurelius Antoninus. (121–180 A.D.) A prominent Stoic philosopher. Adopted as a son by Emperor Antoninus Pius in 138 A.D. As emperor he was engaged in frequent wars. In 175 he visited Egypt and Syria. He founded a chair of philosophy in Athens for each of the sects—Stoic, Platonic, Peripatetic, and Epicurean.

Mare clausum and **Mare liberum** [Lat.]. *Mare clausum*: a sea closed, by authority of a particular sovereign claiming special privileges or rights in it, to general navigation. *Mare liberum*: a sea open to navigation by all, freely. Such it is now universally conceded, are the high seas.

'Et quidem naturali iure communia sunt omnium haec: aer, aqua profluens, et mare, et per hoc littora maris' (*Inst. of Just.*, ii. 1, *de rerum divisione*, 1). A contrary view was supported by the popes in the middle ages, and by Spain and Portugal, claiming exclusive rights by discovery and under papal decrees over the western and southern seas. English jurists in the 17th century, while disputing those claims, set up a claim of English sovereignty as to the northern seas (see Selden, *Mare Clausum*, 1635, and Grotius, *Mare Liberum*, 1609). Russia made a similar claim as to the North Pacific as late as the beginning of this century, on the ground of riparian ownership (see Davis, *Int. Law*, 43).

Literature: Wharton, Int. Law, Dig. i. § 26; Woolsey, Int. Law, § 55; Wheaton, Elem. of Int. Law, chap. iv. (S.E.B.)

Margin of Cultivation: Ger. *Kulturgrenze* (K.G.); Fr. *marge de culture* (L.M.); Ital. *limite di coltivazione*. The point at which, either on account of distance from

market or lack of natural advantages, the value of the products of land barely covers the expense of producing them.

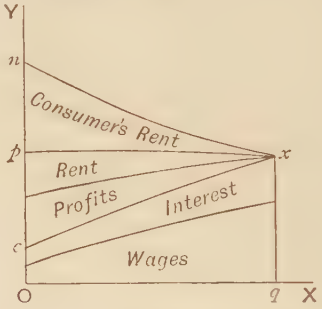
It was by assuming a point of this kind that Ricardo laid the basis of his theory of economic rent. If the demand was such as to necessitate the use of a certain piece of land in supplying a market, the price must be made high enough to cover the expense of production on this land. If other land was better located or more fertile, it would afford the owner a surplus above expenses equal to its advantages over land at the margin of cultivation. (A.T.H.)

Marginal Increment: Ger. *Grenz-* (in combination), *marginal*; Fr. *élémentaire* (*marginal*); Ital. *incremento marginale*. A very small variation in an economic quantity. If the quantity is regarded as changing discontinuously, the term corresponds to finite difference in physics; if it is regarded as changing continuously, it corresponds to differential. See CALCULUS.

It has gradually been discovered that equilibrium in economics, no less than in physics, depends upon differential equations, and may be explained more satisfactorily by differential analysis than by mass analysis pure and simple.

The beginning of this analysis is seen in Ricardo. He rejected Smith's proposition that there is in each community an average rate of rent which the price of food must cover. He showed that, theoretically and to a large extent in practice, the land in use actually varies from a high degree of fertility and productiveness to a low degree. The land which it just pays to cultivate represents, according to Ricardo, the 'margin of cultivation.' The price of the products must just pay wages and profits on this land, otherwise it will go out of use; it cannot be more than this, or some worse land will come into use. Thus the price of the product is a function not of the average productivity of land in use, but of the marginal productivity; and rent is not, as Smith thought, a determining element in price, but a differential gain. Walker applied the same analysis to profits, showing that that part of profit which was due to human skill rather than to capital invested was subject to the same laws as the rent of land; that there was a margin of skill, at which an employer could just maintain himself and no more; that the price of products must, in general, cover wages and interest at this margin; and that surplus profit was a differential gain no less than surplus rent.

The analysis of the effect of marginal utility upon demand came later than the analysis of the effect of marginal expense upon supply. The observed rule that increased quantities consumed in a given time produced diminished increments of pleasure or pain was applied by Gossen (1854), Jevons (1871), and Menger (1871) to show what limits were set to the possibility of marketing products, and, consequently, to the cost which could be incurred for that purpose. Marshall further showed that the consumers, to whom the products had a utility higher than that at the margin, obtained a differential gain analogous to that of the landowners, which he called CONSUMER'S RENT (q. v.).



If we represent quantities produced and consumed on an axis OX, and prices, which may serve as representative of enjoyment or sacrifice, on an axis OY, we shall find that the quantity marketed, Oq, will normally be produced at a marginal expense qx, equal to the marginal utility to the man who is just willing to buy it. In other words, the sacrifice to the last producer just balances the advantage (OPHELIMITY, q. v.) to the last consumer. But some producers have such advantages in location or skill that their actual expense is much less than qx, going down as low as Oc. Competition, by allowing them to receive the market price for their products, gives them an advantage cxp in the form of rent or profits. And some consumers have a similar advantage in utility, which may go as high as Oq. Competition, by allowing them to get their products at the market price, gives them a similar advantage nxp, which we may call consumer's rent.

In this apparently very beautiful analysis there is a fallacy. The whole theory of utility to the consumer as commonly stated is based upon increasing rapidity of stimulus, i. e. rates

of production. The Ricardian law of rent and the whole analysis of cost to producers is based upon the need of increasing quantity of production—more appliances at the old rate of speed. We are really putting two curves into the same figure, which are radically different in their principles of construction. It is too early to say how far this difficulty vitiates our analysis of the subject of consumer's rent.

Literature: IRVING FISHER, Bibliog. of Mathematical Economics, appended to the volume of Cournot; RAND, Bibliog. of Economics. Cf. the literature of ECONOMIC SCIENCE. (A.T.H.)

Marginal Utility: see FINAL UTILITY.

Marheineke, Philipp Konrad. (1780–1846.) Educated at Göttingen. Professor of theology at Erlangen, 1805; at Heidelberg, 1807; at Berlin, 1811, where he was pastor of Trinity Church.

Mark [AS. *mearc*, a bound]: Ger. *Merkmal*; Fr. *marque, attribut*; Ital. *segno* (*contrassegno*), *nota*. To say that a term or thing has a mark is to say that of whatever it can be predicated something else (the mark) can be predicated; and to say that two terms or things have the same mark is simply to say that one term (the mark) can be predicated of whatever either of these terms or things can be predicated.

The word translates the Latin *nota*. It has many practical synonyms, such as quality, mode, attribute, predicate, character, property, determination, consequent, sign. Most of these words are sometimes used in special senses; and even when they are used in a general sense, they may suggest somewhat different points of view from mark. (C.S.P., C.L.F.)

A great oversight which had vitiated the entire discourse of logicians about marks, and had prevented them from fully understanding what marks are, was corrected by Augustus de Morgan when he observed that any collection whatever of individuals has some mark common and peculiar to them. That it is so will appear when we consider that nothing prevents a list of all the things in that collection from being drawn up. Now, the mere being upon that list, although it has not actually been drawn up, constitutes a common and peculiar mark of those individuals. Of course, if anybody tries to specify a number of individuals that have no common and peculiar mark, this very specification confers upon their common and peculiar mark a new degree of actuality.

On the other hand, if two marks are common and peculiar to precisely the same collection of things, they may, for the ordinary purposes of formal logic, be looked upon as the same mark. For it is indifferent to formal logic how objects are marked, whether in a simpler or more complex way. We may, therefore, regard the two marks as constituting together a single mark. Marks, after all, are not the object of logical study; they are only fictitious aids to thought. (C.S.P.)

Market [AS. *market*]: Ger. *Markt*; Fr. *marché*; Ital. *mercato*. A place where prices are determined by competition and made to equalize demand with supply. An extension to modern conditions of the ideas of the mediaeval market or fair.

It makes no difference whether the goods are actually exposed for sale, as in the mediaeval markets, or largely bought and sold on the basis of warrants and telegraphic orders, as in the produce exchanges of to-day. The essential thing is that different buyers and sellers shall know something about one another's transactions, so that the individual buyer need not pay more than the prevailing rate, nor the individual seller be forced to accept less than the prevailing rate.

There may be different markets for the same article in the same place. The prices in the wholesale market may be determined by one set of conditions, and those in the retail market by another. (A.T.H.)

Marriage [Lat. *maritus*, husband, through Fr.]: Ger. *Ehe*; Fr. *mariage*; Ital. *matrimonio*. Any more or less permanent union of the sexes that is sanctioned by the community.

The earliest sanction is no more than a vague general approbation. Later sanctions have explicit legal expression, and assume the form of severe penalties for disobedience of legal prohibitions. The use of the term marriage by many ethnologists, including Westermarck (*Hist. of Human Marriage*), to designate any union of the sexes, sanctioned or not sanctioned, including the mating of animals, is erroneous. The correct use was indicated by J. F. McLennan in the correspondence with Charles Darwin, reproduced in McLennan's *Studies in Ancient History*, second series. McLennan held that polyandry was the first form of marriage, as distinguished from mere mating. Slowly and by many tentative experiments society has arrived at monogamous marriage of individuals not within the first and second degrees of

consanguinity, by prohibiting, successively, incest, polyandry, polygamy, and bigamy. The marriage laws of Europe and America still bear the impress of the deliberations of the Council of Trent. (F.H.G.)

Literature: McLennan and Westermarck, as cited (the latter having an extensive bibliography); Starcke, The Primitive Family. See also under Family. (J.M.B.)

Marsilius Ficinus: see Ficino, Marsiglio.

Martineau, James. (1805–1900.) An English writer in moral and religious philosophy. Of Huguenot ancestry, he was born in Norwich. He attended successively the Norwich Grammar School, Lant Carpenter's private school at Bristol, and a school for engineers at Derby. Changing his plans, he studied theology for five years at Manchester College, situated at that time at York. Admitted to preach, 1827; ordained in Dublin, 1828, he moved to Liverpool. In 1839 he took a prominent part in the Liverpool Controversy, and in 1840 he was appointed professor of mental and moral philosophy in Manchester New College, a position which he held until 1885.

Martyr, Justin: see Justin Martyr.

Mass [Lat. *missa*, dismissal]: Ger. *Messe*; Fr. *messe*; Ital. *messa*. The Sacrament of the Eucharist as administered in the Roman and Greek Churches, in which, through the separate consecration of the bread and wine, the sacrifice of Christ is exhibited and the real body and blood of Christ are received in the communion.

There are several species of Masses, as High Mass, which is accompanied with chant, incense, and the assistance of deacon and subdeacon; Low Mass, which lacks these accompaniments; Requiem Mass, celebrated for the dead; and Pontifical Mass, celebrated by the bishop.

Literature: see Sacrament, and Transubstantiation. (A.T.O.)

Mass (in physics) [Lat. *massa*, a lump]: Ger. *Masse*; Fr. *masse*; Ital. *massa*. The quantity of matter in a body, as measured by the amount of its inertia or the amount of force necessary to produce in it a given motion in a given time, it being entirely free to move in the direction of the force.

The weight of the body at a given place is equally a measure of its mass, and the only measure that can be readily applied in practice. Experiment shows the results of the two measures to be identical, since weight, or gravity, and inertia have the same ratio for all substances. All bodies retain their mass unchanged, whatever transmutations they may undergo. (S.N.)

Material. Matter (q.v.), or, as adjective, belonging to or composed of matter. See also Matter and Form, and cf. topics in Form and Formal. (J.M.B.)

Material Fallacy. This term originated with Whately (*Encyc. Metropolitana*, i. 218 *b*). Whately's material fallacies are those in which the conclusion does follow from the premises. Therefore, excluding the multiple interrogation, which is no syllogism, of the rest of Aristotle's thirteen, only the *ignoratio elenchi* and the *petitio principii* are material. Cf. Fallacy (also for foreign equivalents).

Aldrich had modified Aristotle's division into fallacies *in dictione* and fallacies *extra dictionem*; making a division into *Sophismata in forma argumenti* (*sicubi conclusio non legitime consequatur ex praemissis*), and *Sophismata in materia argumenti* (*sicubi legitime non tamen vere concludere videatur syllogismus*). Under the latter head he placed the *ignoratio elenchi*, the *non causa pro causa*, the *non sequitur*, and the *petitio principii*. Whately's distinction is—whether from a theoretical or a practical point of view—by far the most important that can be drawn among fallacies; so that besides the reason of priority, which ought itself to be final, the needs of the logician forbid us to depart from Whately's definition. Some logicians do not admit material fallacies among the number of fallacies, but consider them to be faults of method (Hamilton, *Lects. on Logic*, xxvi; Ueberweg, *Syst. d. Logik*, §§ 126, 137). E. E. Constance Jones (*Elements of Logic as a Science of Propositions*, § xxvi) reduces them to formal fallacies. Hyslop (*Elements of Logic*, chap. xvii) uses the term material fallacy, quite unjustifiably, to include all fallacies due to something in the matter of reasoning. (C.S.P.)

Material Logic: Ger. *materielle Logik*; Fr. *logique matérielle*; Ital. *logica materiale*. Formal logic classifies arguments by producing forms in which, the letters of the alphabet being replaced by any terms whatever, the result will be a valid, probable, or sophistic argument, as the case may be; material logic is a logic which does not produce such perfectly general forms, but considers a logical universe having peculiar properties.

Such, for example, would be a logic in which every class was assumed to consist of a finite number of individuals; so that the

syllogism of transposed quantity would hold good. In most cases material logic is practically a synonym of applied logic. But a system like Hegel's may also properly be termed material logic. The term originated among the English Occamists of the 14th century, who declared Aristotle's logic to be material, in that it did not hold good of the doctrine of the Trinity. (C.S.P.)

Materialism [Lat. *materialis*, material]: Ger. *Materialismus*; Fr. *matérialisme*; Ital. *materialismo*. That metaphysical theory which regards all the facts of the universe as sufficiently explained by the assumption of body or matter, conceived as extended, impenetrable, eternally existent, and susceptible of movement or change of relative position.

Matter in motion is held to be the fundamental constituent or ultimate fact of the universe; and all phenomena, including the phenomena of consciousness, are reduced by the theory to transformations of material molecules. As Paulsen points out, the reduction of psychical processes to physical is the special thesis of materialism.

The atomism of Leucippus and Democritus is the first formulation of a definitely materialistic system. It is true that in all the theories of the PRE-SOCRATICS (q.v.) the principle of explanation is materialistically conceived, but this is due to the fact that the contrast between matter and spirit had not yet been fully realized. Hence it is customary to apply the term HYLOZOISM (q.v.) to the earliest Greek speculations. But even where the principle of explanation appears most abstract and idealistic, as in the Being of Parmenides, it is found on closer scrutiny that the definition of Being as 'a finite, spherical, motionless plenum' implies the unchallenged identification of being with sensible reality. Hence it has been argued by Burnet (cf. *Early Greek Philos.*, 192–5) that 'Parmenides is not, as some have said, the father of idealism; on the contrary, all materialism depends on his view of reality.' As a matter of fact, the atoms of Leucippus and Democritus correspond exactly to the Eleatic definition of Being. But Parmenides had brought philosophy to an *impasse* through the impossibility of deducing from his immovable one the phenomena of actual experience. The atomists solve this difficulty by placing Non-being or the void alongside of the Eleatic plenum, the latter conceived, however, not monistically, but pluralistically. 'Leucippus,' according to Aristotle's account (*Gen. Corr.*, A. 8. 324 B, 35 ff.), 'thought he had a theory which was in harmony with sense-perception, and did not do away with coming into being and passing away, nor motion, nor the multiplicity of things. . . . For, said he, that which is, strictly speaking, real is an absolute plenum, but the plenum is not one. On the contrary, there are an infinite number of them, and they are invisible owing to the smallness of their bulk. They move in the void (for there is a void), and by their coming together they effect coming-into-being; by their separation, passing-away.' The atomists, as Lange says, were the first to fix the definition of matter and consciously to derive the totality of phenomena solely from matter so conceived. In the form given to it by Democritus, adopted (with a slight modification) by Epicurus and clothed in poetry by Lucretius, the materialistic theory undergoes little change in ancient times. Its characteristic features are (1) the reduction of all qualitative differences to quantitative, namely, to differences in the size, form, arrangement, and situation of the individual atoms, and (2) the denial of intelligent purpose or final cause. The origin of the world-structure from the clash of moving atoms is held to be fully explained by mechanical necessity (*ἀνάγκη*). Of the origin of motion no account is given: it is apparently considered as equally primordial with the existence of the atoms themselves. But the velocity of the atoms is made to depend on the size or mass of the atoms, whence arise those clashings and interferences which sift out the atoms of different kinds, and, by the separations and combinations produced, give rise in process of time to the existing cosmic system. Epicurus adopted the materialism and atomism of Democritus, but modified the principle of natural necessity by ascribing to the atoms (which he conceived as falling through infinite space) a power of voluntary deviation from the direct line of descent, explaining thereby the origin of the clashings and whirling movements from which the ordered system of things took its rise. The Stoics, as the great teleologists of the ancient world, with their pantheistic doctrine of the world-reason, stand at the opposite extreme from the pure atomism of the Epicureans; yet both schools are completely materialistic in their theoretical conceptions. The Stoics go so far as to declare that even the qualities, forces, and relations of things are 'bodies,' and the creative reason is con-

ceived (after Heraclitus) as a warm vital breath penetrating all things and constituting their active principle.

The materialism of Epicurus was revived at the beginning of modern philosophy by Gassendi, who, however, reconciled the theory with orthodox Catholicism by making God the creator of the atoms. About the same time Hobbes defined philosophy as the theory of body and motion, laying down explicitly that 'all that exists is body, all that occurs motion.' But philosophy is concerned, according to Hobbes, only with phenomena or things that appear as generated. Hence God, as ungenerated, is excluded from its scope, and philosophy (which is thus used as equivalent to natural science) has nothing to do with matters of faith. Hence, although Hobbes banishes final causes from philosophy, and gives a completely materialistic account of the relation of body and mind, he can hardly be classed as a materialist in the full philosophical sense of the word; he himself claimed to be an orthodox member of the Church of England. The anthropological materialism, which is so uncompromisingly taught by Hobbes, appears in several successive English thinkers, who combine it with a theistic or deistic theory of the universe as a whole. Even Locke, while holding that matter must have been created, and that it is in itself devoid of consciousness (and even perhaps of any active power), designedly leaves the immateriality of the soul an open question, 'it being, in respect of our notions, not much more remote from our comprehension to conceive that God can, if he pleases, superadd to matter a faculty of thinking than that he should superadd to it another substance with a faculty of thinking' (*Essay*, iv. 3, 6). Hartley's doctrine of association is expressed in terms of movements in the brain, and his disciple, Priestley, avowedly held the soul to be material, treating psychical phenomena as consisting literally in the material motions of the brain.

It was in France in the 18th century that the great modern development of philosophical materialism took place in the writings of Lamettrie and the Encyclopedists (q. v.). Baron d'Holbach's *Système de la Nature*, published in 1770, represents the culmination of the movement. After the succession of idealistic systems in Germany in the end of the 18th and the beginning of the 19th century, materialism began, partly by way of reaction, to raise its head again about the middle of the century. Moleschott, Vogt, and Büchner may be mentioned as leaders. Büchner's *Kraft und Stoff*, although crude and vague and of no real philosophical significance, is a fair type of the popular materialistic arguments and conclusions in the second half of the century, seeing that it has passed through sixteen or more editions since its publication in 1855, and has been translated into thirteen foreign languages. The concentration of mental energy on the problems of science, and the great advance of the biological sciences in particular, have given a materialistic colouring to much recent speculation that would decline to identify itself with dogmatic materialism. The agnosticism of Huxley and of Herbert Spencer might be instanced as acknowledging in theory the co-equal rights of mind and matter, but in practice laying the stress of explanation upon the material side. Materialism as a dogmatic system hardly survives in philosophical circles, although, in alliance with secularism and socialism, it is no doubt influential among certain sections of the working-classes, and often forms the creed of the half-educated specialist. The place of materialism has been taken by scientific Monism (q.v.), which, however, in some of its representatives, seems often to be but slightly differentiated from the materialism which it has superseded.

'Ethical materialism' (Lange) and 'practical materialism' (Külpe) are terms used to denote the temper of mind which sees in the acquisition of wealth, material comfort, and sensuous pleasure the only reasonable objects of human endeavour. Lange, in his great work, considers dogmatic materialism to be impossible after the epistemological criticism of Kant, but regards it as a regulative principle of scientific inquiry. The chief epistemological, metaphysical, and scientific arguments against materialism (as well as the considerations on which it is based) are discussed by Lange and are summarized in Flint, Paulsen, and Külpe.

The term materialist is stated by Eucken (*Grundbegriffe der Gegenwart*, 97) to have been first used by Robert Boyle in his work on *The Excellence and Grounds of the Mechanical Philosophy*, 1674. Idealist and materialist appear frequently in Wolff as the two varieties of monist (monism being here opposed to dualism).

Literature: Lange, Hist. of Materialism (Eng. trans.); Flint, Antitheistic Theories, lects. ii–iv and notes 5–19; Paulsen,

Einleitung in die Philos., 63–90; KÜLPE, Einleitung in die Philos., 127–37 (who distinguishes the different logical forms of materialisms). See also PAUL JANET, Le Matér. contemporain (6th ed.). Recent materialistic views in psychology are expounded by BALDWIN, Recent Discussion in Materialism, Presb. and Ref. Rev., i. (1890) 357. Cf. also the Encyclopedias, sub verbo; and BIBLIOG. B, 2, *e*. (A.S.P.P.)

Mathematical Economics: Ger. *mathematische Oekonomik*; Fr. *économie mathématique*; Ital. *economia matematica*. The development of notations and functions which serve to connect our experience with regard to balance of motives with our observation as to quantities of wealth; thus enabling the study of either set of phenomena to be used to explain the others quantitatively.

The differential equations of economics are mostly in terms of motive, the integrals mostly in terms of wealth.

The pioneer in mathematical economics was Cournot; his work has been extended by Dupuit and by Marshall. The efforts of v. Thünen were less permanently fruitful than those of Cournot. See SUPPLY AND DEMAND.

Another line of thought, first developed by Gossen, and afterwards (non-mathematically) by Menger, was made an instrument of powerful analysis by Jevons, and by the Austrian school after him (see MARGINAL INCREMENT). Among more recent mathematical economists we may note Auspitz and Lieben, Edgeworth, Fisher, and Pareto.

As Cohn well observes, mathematical methods in economics must not be confounded with statistical ones. The latter represent the extreme of concreteness, the former the extreme of abstraction. (A.T.H.)

Mathematical Logic: Ger. (1) *Logik der Mathematik*; Fr. (1) *logique des mathématiques*; Ital. (1) *logica della matematica*. (1) The logical analysis of mathematics. (C.S.P.)

(2) SYMBOLIC LOGIC (q. v.).

Literature (to 1): the logic of arithmetic is treated by DEDEKIND in his Was sind und was sollen die Zahlen? (Eng. trans. in Essays on Number, 1901). See also the ninth lecture of the third volume of SCHRÖDER, Logik; and FINE, Number System of Algebra. For the logic of the calculus, see the second edition of JORDAN, Cours d'Analyse; also CLIFFORD, Theory of Metrics, in his Mathematical Papers; WEBER, Algebra; and the papers of G. CANTOR, some of which are contained in the Acta Mathematica, ii, and subsequent ones in the Mathematische Annalen, 15, 17, 20, 21, 23, 46, 49. LISTING'S papers on topical geometry are two, one in the Gött. Abhand., the other in the Gött. Nachr. Several of RIEMANN'S papers are valuable in a logical point of view. See also CAUCHY, Théorie des Clefs. PETERSEN, Methods and Theories, shows how to solve problems in elementary geometry. Cf. MATHEMATICS. (C.S.P.)

Mathematics [Gr. *μαθηματική*, from *μαθήματα*, things learned]: Ger. *Mathematik*; Fr. *mathématiques*; Ital. *matematica*. A science of abstract relationships. These are by no means exclusively quantitative. The projective properties of curves, for instance, of which an example is given below, are purely positional. And the whole of analysis may be presented in the form of an abstract calculus of symbols to which no meaning of any kind need be assigned, the operations themselves being defined by certain formal laws, as addition by the laws $a+b=b+a$ and $(a+b)+c=a+(b+c)$. (J.M.B.–H.B.F.)

'Any conception which is definitely and completely determined by means of a finite number of specifications, say by assigning a finite number of elements, is a mathematical conception. Mathematics has for its function to develop the consequences involved in the definitions of a group of mathematical conceptions' (Chrystal) combined with certain fundamental principles, or axioms and postulates. (C.L.F., F.F.)

One of the most distinctive characteristics of mathematics is the extreme definiteness of the conceptions with which it deals. They admit of exact definition by a limited number of marks.

The more fundamental of these conceptions correspond immediately to things and relations among things in the external world, from which, in fact, they have been derived by a process of abstraction. Such are the conceptions of cardinal numbers and of the ordinal arrangement of the cardinal numbers on which arithmetic is based (see NUMBER); the conceptions of point, line, &c., and of such fundamental relations as that two points determine a right line, &c., which lie at the basis of geometry.

It is the function of mathematics to make the simplest possible selection of such of these primary conceptions as are mutually independent, and by combining them and generalizing them, to create a body of more complex conceptions which have intrinsic interest and beauty and a value for the furtherance of the science itself or for the study of other

positive sciences. The extraordinary developments of the number-concept will serve as a familiar illustration of the extent to which the process of generalization is carried in mathematics.

For the investigation of these complex relationships, it must also invent an adequate symbolism.

It is customary to call those sciences 'mathematical' in which there exist, among the results of observation, certain fundamental relations so simple and definite that they can be represented with advantage by mathematical conceptions, and to denominate the disciplines which grow out of the mathematical discussion of these conceptions the 'applied mathematics.' Strictly speaking, geometry itself is a branch of the applied mathematics.

Very characteristic of the modern mathematics is the prominence of the notions: *manifoldnesses* or *assemblages* of actual or ideal elements of some kind, e. g. of points, lines, or surfaces; the *transformations* or *substitutions* by which the elements of two assemblages may be brought into definite relations of correspondence; and the *invariantive properties* of assemblages, i. e. the properties which remain unchanged by given *groups of transformations*. In fact, to such an extent do these notions, in some form or other, underlie the various branches of mathematics, that it is almost admissible to define mathematics as the science of assemblages.

To cite one or two illustrations:—

(1) The simplest class of assemblages are finite groups of distinct things. The invariantive property of such a group is its cardinal number—the property which remains unchanged by every 'transformation,' which merely changes the arrangement of the things in the group or replaces them, one for one, by other things.

(2) Every functional relation (see FUNCTION) between two variables y and x, say $y = x^2$, is a relation of correspondence between two number-assemblages—the values of x, on the one hand, and those of y on the other.

(3) In the study of a curve by the analytic method, we substitute for the curve itself the assemblage which consists of all the points upon it. The equation of the curve, $y = f(x)$, is merely a statement of the relation of correspondence into which this assemblage can be brought to another point assemblage—that which consists of all points on the x axis. And the equation $y = f(x)$ serves this purpose, because, before undertaking the study of the particular curve, we set up a definite relation of one-to-one correspondence between the assemblage of all the points of the plane and the assemblage of all possible pairs of real values of the variables x and y. Cf. IMAGING.

(4) We can transform an algebraic curve whose equation is $\phi(x, y) = 0$ into an endless variety of other curves by substituting for x and y, in the equation $\phi(x, y) = 0$, various functions of these variables.

But there is a group of such substitutions distinguished from all others by the fact that they leave invariant the 'order' of the curve $\phi(x, y) = 0$, that is, the greatest number of points in which it can be cut by a right line. This is the group of 'linear' substitutions, defined by all possible equations of the form

$$x = \frac{ax' + by' + c}{a''x' + b''y' + c''}, \quad y = \frac{a'x' + b'y' + c'}{a''x' + b''y' + c''}.$$

The curve has other properties which also remain invariant by this group of substitutions. Thus, if the equation $\phi(x, y) = 0$ be of the second degree, it will ordinarily represent a 'proper' conic, that is, an ellipse, hyperbola, or parabola; but it may also represent a pair of intersecting straight lines, which may be characterized as a conic possessing a 'singular point'—the point of intersection of the lines. The presence or absence of such a singular point in the conic $\phi(x, y) = 0$ is an invariantive property of this curve with respect to the group of linear substitutions; that is, if $\phi(x, y) = 0$ be a proper conic, so will every conic be into which it can be transformed by a substitution of this group; if it be a pair of right lines, so will every conic be into which it can be transformed by a substitution of the group.

We may add that the properties of a curve which remain thus unchanged by linear transformation are called its 'projective' properties; those which do not, its 'metrical' properties.

Literature: CLIFFORD, Essays and Addresses; KLEIN, Lectures on Mathematics; POINCARÉ, papers in the Monist and Rev. de Mét. et de Mor. (1898–1901); RUSSELL, The Foundations of Geometry; MACH, papers in the Monist (1899–1901). (H.B.F.)

Matriarchate [Lat. *mater*, Gr. *μήτηρ*, mother, + *ἀρχός*, leader, ruler]: Ger. *Mutterrecht*, *Matriarchat*; Fr. *matriarcat*; Ital. *matriarcato*. A family, clan, or tribe ruled by a woman or by women.

This term was introduced into ethnology by Backofen (*Das Mutterrecht*), and was adopted by E. B. Tylor and others. There is no proof that a matriarchate has ever existed, so-called matriarchal groups being probably merely METRONYMIC (q. v.). 'Children took the name of mothers. . . . This is really the origin of the so-called matriarchate, in which the mother had in fact no power, but gave her name to her child' (G. Bertin, *J. of the Anthropol. Inst.*, xviii. 271). (F.H.G.)

Matronymic: see METRONYMIC.

Matter: see EXTERNAL (different topics), BELIEF, EPISTEMOLOGY, PHILOSOPHY, and the following topics.

Matter (in physics) [Lat. *materia*, stuff]: Ger. *Materie*; Fr. *matière*; Ital. *materia*. The substance of which the sensible universe seems to us to be composed.

Its existence is manifested by an infinite variety of ever-changing phenomena, which we may consider as growing out of the direct or indirect action of matter upon our organs of sense. Thus, when we feel the object, we conceive it to act directly upon the nerves of sensation; when we see it, the action is that of light, and is therefore indirect. What differentiates matter from the phenomena or actions of which alone we are directly conscious is its permanence. The object which I call a chair presents itself to my senses in a great variety of more or less complex combinations, according to the point from which I view it or the way I touch it. If I leave the room in which it is placed, these phenomena cease entirely. From the fact that I can reproduce them at pleasure by going where the chair is—that by assuming the existence of the matter composing the chair as a reality, independent of my own existence, I can account in a very simple way for an infinitely complex series of experiences which could not be reduced to law in any other way—we have the strongest ground for our belief in the real existence of matter.

What attributes are we justified in assigning to this reality? We answer: those attributes which are necessary to account for the phenomena, and no others. Two associated attributes which are essential to our conception of matter are EXTENSION (q.v.) and IMPENETRABILITY (q. v.). Matter occupies space; two portions of matter cannot occupy the same position in space at the same time.

Such is our primary conception: but experience leads us to doubt whether these qualities are absolute. If we hold a lump of sugar in water, we find that the water penetrates the sugar. We account for this by saying that the matter of the sugar is not a plenum; that there are unoccupied spaces between the particles, into which the water penetrates. But if we admit that the lump which seems to us a plenum—a continuous space-filling mass—is not such, where shall we stop? What space is really occupied by the ultimate parts of the mass?

This question gives rise to the hypothesis of Boscovich—that matter is composed of points endowed with inertia and certain powers of mutual attraction and repulsion. As two particles or atoms are brought closer, a distance is reached at which the mutual repulsion increases without limit as the distance is lessened, so that the two points cannot be brought into absolute coincidence by any amount of force.

This hypothesis is far from accounting for all the molecular phenomena of matter, cohesion, &c., but its elimination of extension and impenetrability as primary attributes is a distinctive step forward. To compare this and the natural conception, I hold a billiard ball in my hand. If I squeeze the ball, it resists. I conceive of the ball as filling a certain space, and passively resisting my effort to put my hand into the same space. But what I really feel, and all that I really feel, is a repulsive force between the matter of the ball and that of my hand. The latter presses the ball; by the law of action and reaction the ball equally presses the hand; the pressure is all that I feel, and pressure is only a force. How it happens that we posit a passive space-filling substratum when we feel only a force is an interesting question of genetic psychology; perhaps it is because the passive form of the conception is the easier one, and does not involve any use of the law of action and reaction. The vital point is that the attributes of impenetrability and extension become apparent or secondary ones.

Atoms. The ancient doctrine that matter is not infinitely divisible, but is composed of minute parts called atoms, which remain unchanged through all the chemical and physical processes to which matter can be subjected, seems to be justified by the great mass of facts which make up our chemistry and physics. The attributes of atoms are conceived of as, in themselves, invariable, though possibly subject to differences of manifestation under different surrounding conditions.

From this point of view every atom of the

same kind of matter, or of the same chemical element, must have the same mass. A series of numbers proportional to the masses of different kinds of atoms are called the *atomic weights*. For example, if we take the mass of an atom of hydrogen as unity, then that of an atom of oxygen will be about 8, of carbon about 6, &c. These numbers are only relative, since nothing is known of the absolute mass of any one atom. Cf. CHEMICAL SYNTHESIS. For the atom in philosophy, see MONAD.

Molecules. Most substances with which we are familiar are compounded of various elements: hence these smallest portions must be capable of subdivision into these elements, and therefore cannot be atoms. These smallest portions, portions which cannot be divided without changing the chemical properties of the compound, are called molecules. The distinction between an atom and a molecule is that the latter is subject to division, while the former is not.

Elements are the different kinds of matter which cannot be decomposed, and which therefore make up the substance of the material universe. From a purely logical point of view, the distinction between an element and a compound would seem to be relative to our knowledge at the moment. Possibly many of what we call elements are compounds which we have not succeeded in decomposing; and the idea that all matter may be of one kind, and all atoms be really molecules made up of different arrangements of one kind of primaeval atoms, has been widely entertained, and may be well founded. But it is a significant fact in this connection that no progress is being made in the way of decomposing the accepted elements. In no case has a substance accepted in our modern chemistry as an element been decomposed or transformed into another. The distinction between elements and compounds is therefore a real one in kind, whether, in the absolute sense, an atom is or is not a compound. (S.N.)

Matter and Form: Ger. *Materie* (*Stoff*) *und Form*; Fr. *la matière et la forme*; Ital. *materia e forma*. The word matter (Lat. *materia*, which was used to translate the Gr. ὕλη) is often employed where the more appropriate Greek word would be σῶμα, *corpus*, body; or τὸ ὑποκείμενον, *subjectum*, or even ἡ ὑπόστασις, translated *person* in theology. Form (Lat. *forma*, used to translate the Gr. μορφή and εἶδος, though the latter is more exactly represented by *species*) is often employed where σχῆμα, figure, or τύπος, shape, would be near equivalents. The Greek expressions μορφή, παραδεῖγμα, εἶδος, ἰδέα, τὸ τί ἐστί, τὸ τί ἦν εἶναι, are pretty nearly synonymous.

The distinction of matter and form was first made, apparently, by Aristotle. It almost involves his metaphysical doctrine; and as long as his reign lasted, it was dominant. Afterwards it was in disfavour; but Kant applied the terms, as he did many others drawn from the same source, to an analogous but widely different distinction. In many special phrases the Aristotelian and Kantian senses almost coalesce, in others they are quite disconnected. It will, therefore, be convenient to consider: (1) the Aristotelian distinction; (2) the Kantian distinction; and (3) special applications.

The Aristotelian distinction. Not only was the distinction originated by Aristotle, but one of the two conceptions, that of *matter*, is largely due to him. Indeed, it is perhaps true that the Greek word for matter in the sense of material, ὕλη, was never understood in that general sense before Aristotle came to Athens. For the first unquestionable cases of that meaning occur in certain dialogues of Plato, concerning which—though there are no dates that are not open to dispute—it seems to the present writer that it is as certain as any such fact in the history of Greek philosophy that the earliest of them was written about the time of Aristotle's arrival. It is true that, as Aristotle himself says, *matter* was the earliest philosophical conception. For the first Ionian philosophers directed their thoughts to the question what the world was made of. But the extreme vagueness of the notion with them is shown by their calling it ἡ ἀρχή, the beginning, by the nonsense of the question, and by many more special symptoms. If the philosophical conception of matter distinguished the metaphysics of Aristotle, that of Plato had been no less marked by its extraordinary development of the notion of form, to which the mixed morality and questioning spirit of Socrates had naturally led up; the morality, because the form is the complex of characters that a thing ought to have; the questioning, because it drew attention to the difference between those elements of truth which experience brutally forces upon us, and those of which reason persuades us, which latter make up the form. But Aristotle's distinction set form, as well as matter, in a new light.

It must not be forgotten that Aristotle was an Asclepiad, that is, that he belonged to a family which for generation after generation,

from prehistoric times, had had their attention turned to vital phenomena; and he is almost as remarkable for his capacity as a naturalist as he is for his incapacity in physics and mathematics. He must have had prominently before his mind the fact that all eggs are very much alike, and all seeds are very much alike, while the animals that grow out of the one, the plants that grow out of the other, are as different as possible. Accordingly, his dunamis is germinal being, not amounting to existence; while his entelechy is the perfect thing that ought to grow out of that germ. Matter, which he associates with stuff, timber, metal, is that undifferentiated element of a thing which it must possess to have even germinal being. Since matter is, in itself, indeterminate, it is also in itself unknowable; but it is both determinable by form and knowable, even sensible, through form. The notion that the form can antecede matter is, to Aristotle, perfectly ridiculous. It is the result of the development of matter. He looks upon the problem from the point of view of a naturalist. In particular, the soul is an outgrowth of the body.

The scholastics, who regarded Aristotle as all but infallible, yet to whom the ideas of a naturalist were utterly foreign, who were thoroughly theological in their notions, admitted that the soul was a form. But then, they had great difficulty with those opinions of their master which depended upon his conceiving of matter as more primitive than form. Their notions of form were rather allied to those of Plato. The mode of being that, in some sense, anteceded individual existence, they would have held to be one in which there was form without matter, if awe of Aristotle had not caused them to modify the proposition in one way or another. A question, for example, which exercised them greatly was, how the form was restricted to individual existence? For Aristotle there could not be any such question, because he did not conceive of a form taking on individuality, but of an undifferentiated matter taking on, or rather developing, form, and individuality, perhaps, with it (412 *a*, 7).

The Kantian distinction. Aristotle refuses to consider any proposition as *science* which is not universal. He does not go so far as to say that all knowledge involves synthesis, but he often approaches doing so. In particular, he holds that matter is something in itself beyond our knowledge, but the existence of which has to be assumed in order to synthetize the opposites that are involved in all change. He expressly defines that as the function of the conception of matter. With Kant, the view that all knowledge involves synthesis—various acts of synthesis one over another—is vastly more developed; and he, too, employs the terms *matter* and *form* as called for by such synthesis. But it is curious that while with Aristotle it is matter that is the quasi-hypothesis imported into the facts that the mind may synthetize, with Kant, on the other hand, it is form which performs this function. The matter of cognition consists of those elements which are brutally and severally forced upon us by experience. By the form he means the rational or intelligible elements of cognition, which he wishes, as far as possible, to regard as independent contributions of the mind itself, which we have no right to suppose are duplicated by anything corresponding to them in the thing. For the Aristotelian, all pure matter is exactly alike, equally devoid of all predicates, while the forms make all the variety of the universe. For the Kantian, on the other hand, matter is the manifold, while the pure forms are the few different modes of unity. Nevertheless, the Kantians—indeed, Kant himself (see the *Critic of the Pure Reason*, 1st ed., 266)—argued that they were using the terms in their old and accepted sense. What enabled them to give some speciousness to their contention was the circumstance that during the full century and more of neglect of the Aristotelian doctrine that had intervened, certain secondary senses of the term *matter*, especially that of corporeal matter, and that of a species of corporeal matter, had become relatively prominent.

Special senses. Although there is only one *first* or *primary* matter, absolutely indeterminate, yet Aristotle often uses the term in a modified sense as that which is relatively indeterminate; so that the *last* or *second* matter is the same as the form. But these phrases are also used in quite other senses, which need not here be specially noticed. Matter being taken relatively, the same thing can have this or that as its matter in different respects; and so matter is distinguished into *materia ex qua*, *in qua*, and *circa quam*. *Materia ex qua* is the material; silver is the *materia ex qua* of a dime. *Materia in qua* is the subject in which the form inheres; *materia circa quam* is the object. Aquinas illustrates the distinction by virtue, which is a form, and, as such, has no *materia ex qua*; but it

has a subject in which it inheres and an object upon which it is exercised. Aquinas introduced the term *signate matter*. Matter of composition, or *proximate matter*, is that of which a thing consists; matter of generation, or *remote matter*, that from which it is developed, as a seed or egg.

The varieties of form are so numerous that they may best be taken in alphabetical order.

Absolute form: form abstracted from matter.

Accidental form: an accident, or that the presence of which constitutes an accident; as music is the accidental form of the musician.

Advenient form: a form subsequent to the final form.

Apprehended form = apprehended SPECIES (q. v.).

Artificial form: a form superinduced by art.

Assistant form: an agent aiding in the realization of a form, especially of that whose essential character is to move; as the angel who turns the heavens round once every twenty-four hours, or the captain of a ship.

Astral form. According to Gilbert (*De Magnete*), phenomena of electricity are produced by a material effluvium, while the action of a magnet takes place directly at a distance. Whatever it may be then which constitutes the magnetic field, not being matter, must be called form. Gilbert names it *forma prima radicalis et astralis*.

Common form: a form belonging to a species.

Completive form: used by Aquinas in the sense of the last of the series of forms which gradually bring a thing to fully developed existence. By Aristotle called *last form*.

Composite form: the form of a collective whole, so far as it is different from its parts.

Corporeal form: a form of a corporeal nature. This is used by Aquinas, *Summa Theol.*, pars I. qu. lxv. art. 4. See *Material form*.

Disponent form: a form rendering matter apt to receive another, *principal*, form. Thus, dryness in wood disposes it to receive combustibility.

Elementary form: one of the four combinations of hot and cold with moist and dry which were supposed to characterize the four elements.

Exemplar form: an idea.

Final form: see *Completive form*.

General form: the form of a genus; as we should now say a *generic* form.

Immaterial form: a form which neither depends upon matter while it is being made nor after it is made; a term employed in the theological doctrine of creation.

Incorruptible form: a form not subject to corruption.

Individual form: in one of the theories of individuation, was a form which by existing in matter acquired the power of individuating another form.

Informant form: a form which is a part of the thing of which it is the form.

Inherent form: a form which can only exist in a state of inherence in matter.

Intellective form: the mind as form.

Intelligible form: see *Sensible form*.

Intermediate form: a form having a middle position between an elementary and a completive form.

Material form: a term of Scotus, who defines it as follows: 'Formam materialem dico esse omnem illam, quae ex natura sua necessario inclinatur naturaliter, ut sit actus materiae, sive sit substantialis, sive accidentalis' (*Op. Oxon.*, IV. i. 1); 'Ideo dici potest tertio modo.' But elsewhere (ibid., I Post. qu. ii.) he distinguishes two senses of the term: 'Forma materialis potest intelligi dupliciter. Uno modo dicitur, quae educitur de potentia materiae, vel quia utitur organo corporeo in operando: et isto modo forma intellectiva non est forma materialis. Alio modo dicitur forma materialis, quia perfectio materiae, et isto modo anima intellectiva est forma materialis, ideo aliquam variationem potest accipere a materia, quam perficit, quia ex materia et forma fit vere unum.' Perhaps the most accessible book from which to gain a hint of the nature of the difficulty which gives rise to this distinction is Bridges' edition of what is called *The Opus Majus of Roger Bacon*, ii. 507–11, cap. ii.

Mathematical form: an object of mathematical contemplation, and the result of mathematical abstraction.

Metaphysical form: form in the philosophical sense.

Native or *natural form*, *forma in natura exsistens*, *forma naturae*, *form of a nature*, is a term going back to John of Salisbury (*Opera*, ed. Giles, v. 92), and closely connected, if not synonymous, with *material form*. Certain questions started by Aristotle in Book V of the *Metaphysics* (of which there is an admirable periphrastic translation by Grote, *Aristotle*, 2nd ed., 619 ff.) gave rise to discussions in which the doctrine was compared with Christian beliefs; and the *natural form* plays a considerable part in such discussions.

Bacon adopted the term *forma naturae*. He did not grossly depart from the received

meaning of the term, but owing to his occupying himself with inquiries quite antipodal to those of the scholastics, the two parties did not understand one another. Bacon means the physical explanation of a phenomenon, its occult *modus operandi*. Among the followers of Bacon we, at first, hear a great deal about forms. Boyle wrote whole books about them. But the distinction of matter and form was not calculated to further such inquiries as theirs. It is adapted to expressing phenomena of life. It might be twisted to such a purpose as Gilbert put it to (see *Astral form*), but it was not suited to the mechanical philosophy of Boyle, and only led to wordy and fruitless discussions.

Participate form: a form considered as it is united with matter.

Preparatory form: a term used by Boyle where *disponent* form would be more technical. He says, 'The preparatory form is but (if I may so speak) a harbinger that disposes the matter to receive a more perfect form, which, if it be not to be succeeded by any other more noble, is entitled the specific form of that body; as in the embryo, the vegetative and the sensitive soul is but preparatory to the rational, which alone is said to be the specific form of man' (*Free Considerations about Subordinate Forms*).

Physical form: such forms as may form the object of physical inquiries. Of course, the term was very differently understood during scholastic times and in the 17th century. But the above definition covers both uses.

Primary form. There is no such well-recognized term of metaphysics; but a remark of William Gilbert leads us to suppose that medical men attached some meaning to it.

Principal form is that which *per se* constitutes a species. Called also *specific form*.

Radical form: see *Astral form*.

Sensible form. Though it chances that Aristotle nowhere distinguishes μορφή into αἰσθητή and νοητή, yet his followers did. Sensible forms are those which the outward senses distinguish; intelligible are those which the intellect alone can distinguish.

Significate form: a Thomistic term, a form distinguished by a name.

Simple form: form without matter. 'Forma simplex, quae est purus actus, est solus deus,' says St. Thomas.

Specific form: see *Principal form*.

Subsistent form: a form capable of existing separate from matter, as Aquinas holds that the angels and departed spirits are.

Substantial form: a form which constitutes a *nature*, i.e. a species or genus. Thus, the accidental form of a musician is music; but his substantial form is the rational soul which makes him a man. When men's thoughts became turned from theology to the investigation of physics, those who were animated by the new spirit found themselves confronted with objections based upon allegations of substantial forms. That these substantial forms, so used, were merely a hindrance to the progress of science, was quite plain to them. But the objections were urged with a logical accuracy, born of centuries of study, with which the new men were utterly incapable of coping. Their proper course would have been quietly to pursue their own inquiries, and leave the theologians to square their results with philosophy as best they could. But circumstances did not permit this. The theologians had the popular intelligence and the arm of power on their side; and when an apparent opposition arose, they naturally exerted themselves to put it down. Thus, the innovators were led to protest against these senseless and harmful substantial forms; and they had to formulate their objections to them—a business for which they were entirely unfitted. But since the discoveries of the physicists were plainly adding to man's knowledge and power, while their antagonists were simply obstructive, the former soon carried the day in the general opinion of mankind. The history proves that there was something vicious about the theological application of *substantial forms*; but it in no degree goes to show that the physicists accurately defined the objection to that application. In reviewing the arguments at the present day, when the position of the mechanical philosophers is becoming almost as obsolete as that of the scholastic doctors, we first note that when the new men denied that the substantial forms were 'entities,' what they really had in mind was, that those forms had not such a mode of being as would confer upon them the power dynamical to react upon things. The Scotists, for it was they upon whom, as being in possession of the universities, the brunt of the battle fell, had in fact never called the substantial forms 'entities,' a word sounding like a Scotistic term, but in fact the mere caricature of such a term. But had they used the word, nothing more innocent than the only meaning it could bear for them could be imagined. To call a form an 'entity' could hardly mean more

than to call it an abstraction. If the distinction of matter and form could have any value at all, it was the substantial forms that were, properly speaking, forms. If the Scotists could really specify any natural class, say man—and physics was at that time in no condition to raise any just doubt upon that score—then they were perfectly justified in giving a name to the intelligible characteristic of that class, and that was all the substantial form made any pretension to being. But the Scotists were guilty of two faults. The first—great enough, certainly, but relatively inconsiderable—was often referred to, though not distinctly analysed and brought home to them. It was that they were utterly uncritical in accepting classes as natural, and seemed to think that ordinary language was a sufficient guarantee in the matter. Their other and principal fault, which may with justice be called a sin, since it involved a certain moral delinquency, was that they set up their idle logical distinctions as precluding all physical inquiry. The physicists and Scotists, being intent upon widely discrepant purposes, could not understand one another. There was a tolerably good excuse for the physicist, since the intention of the Scotist was of an abstract and technical kind, not easily understood. But there was no other excuse for the Scotist than that he was so drugged with his metaphysics that ordinary human needs had lost all appeal to him. All through the 18th century and a large part of the 19th, exclamations against the monstrousness of the scholastic dogma that substantial forms were entities continued to be part of the stock-in-trade of metaphysicians, and it accorded with the prevalent nominalism. But nowadays, when it is clearly seen that physical science gives its assent much more to scholastic realism (limited closely to its formal statement) than it does to nominalism, a view of the history more like that here put forward is beginning to prevail.

In the following terms, mostly Kantian, prepositional phrases express the qualifications.

Form of corporeity: a very common term of scholasticism, originating with Avicenna, and used by Aquinas (*Summa Theol.*, pars i. cap. lxvi. art. 2), but more particularly by Scotus (in his great discussion *Opus Oxon.*, IV. dist. xi. 9. 3, beginning 'De secundo articulo dico') and by all his followers. The point is, that the rational soul, being purely spiritual, cannot confer corporeity upon the human body, but a special form, the form of corporeity, is requisite. Suarez and others, generally Thomists, as well as Henry of Ghent, denied this on the ground that a species has but one form. Thus a great metaphysical dispute arose. It sprung from the study of the doctrine of transubstantiation. See Cavellus, *Suppl. ad quaest. Scoti in De Anima*, disp. i, which is in the Lyons ed. of Scotus, tom. ii.

Form of cognition, in Kant's doctrine, is that element of knowledge which the matter of experience must assume in order to be apprehended by the mind. Kant seems to have been thinking of legal forms which must be complied with in order to give standing before a court. So an English sovereign, in order to be crowned, must, as a 'matter of form,' swear to an intensity of loathing for Romish dogmas which he probably regards with great coolness. Kant's definitions are chiefly the following:—

'In the phenomenon, that which corresponds to the impression of sense, I call the matter of it; while that which constitutes the fact that manifoldness of the phenomenon is intuited as ordered in certain relations, I call the form of the phenomenon' (*Krit. d. reinen Vernunft*, 1st ed., 20).

'All cognition requires a concept, be it as imperfect and dark as you will; and this, in respect to its form, is always a universal which serves as a rule' (ibid., 106).

'The transcendental unity of the synthesis of the imagination is the pure form of all possible cognition, through which, consequently, all objects of possible experience must *a priori* be represented' (ibid., 118).

'There are two factors in cognition; first, the concept by which any object is thought—that is, the category; and secondly, the intuition by which that object is given. For if the concept had had no corresponding intuition, it would be a thought, no doubt, as far as its form goes; but having no object, no cognition whatsoever [he means, whether true or false] of anything would be possible by it; since, so far as I should know, there would be nothing, and perhaps could be nothing, to which such a concept would be applicable' (2nd ed. of the Deduction of the Categories, § 22).

'It is not more surprising that the laws of phenomena in nature must agree with the understanding and its *a priori* form, i.e. with its power of combining any manifold, than that the phenomena themselves must agree with the *a priori* form of sensuous intuition.

For just as phenomena have no existence in themselves, but are merely relative to the mind, as having senses, so laws do not exist in the phenomena, but are merely relative to the mind in which the phenomena inhere, that mind exercising understanding' (and see the rest of this passage, ibid., § 26).

Form of forms. Francis Bacon says 'the soul may be called the form of forms,' which would be a pretty conceit, were it not plagiarized from the serious doctrine of Aristotle: ὁ νοῦς εἶδος εἰδῶν (432 *a*, 2).

The terms *matter* and *form* are used in certain peculiar ways in logic. Speaking *materialiter*, the matter of a proposition is said to be its subject and predicate, while the copula is its form. But speaking *formaliter*, the matter of a proposition is, as we familiarly say, the 'matter of fact' to which the proposition relates; or as defined by the scholastics, 'habitudo extremorum adinvicem.' The second tractate of the *Summulae* of Petrus Hispanus begins with the words: 'Propositionum triplex est materia; scilicet, naturalis, contingens, et remota. Naturalis est illa in qua praedicatum essentia subiecti vel proprium eius; ut, homo est animal; vel, homo est risibilis. Contingens est illa in qua praedicatum potest adesse et abesse subiecto praeter subiecti corruptionem; ut, homo est albus, homo non est albus. Remota est illa in qua praedicatum non potest convenire cum subiecto; ut, homo est asinus.'

Of a syllogism, the proximate matter is the three propositions; the remote, the three terms. The form, which ought to be the *ergo*, by the same right by which the copula is recognized as the form of the proposition, is said to be 'apta trium propositionum dispositio ad conclusionem ex praemissis necessario colligendam.' But Kant, in the *Logik* by Jäsche, § 59, makes the premises the matter, and the conclusion the form. (C.S.P.)

Maxim (in ethics) [Lat. *maxima sententia*, opinion of greatest weight]: Ger. *Maxime*; Fr. *maxime*; Ital. *massima*. (1) Any important principle for the regulation of conduct.

(2) A technical term in Kant's ethics: a practical principle regarded by the agent as valid for his own will.

In this latter sense a maxim is distinguished from a practical law. The latter is regarded as objectively valid, or valid for the will of every rational being. Morality consists, according to Kant, in the objective law becoming also the subjective maxim of the will; and his moral imperative is accordingly expressed in the terms, 'Act so that the maxim of thy will can always at the same time hold good as a principle of universal legislation.' Cf. Kant, *Krit. d. prakt. Vernunft*, Pt. I. Bk. II. chap. i. §§ 1 and 7. (W.R.S.)

Maxim (in logic). A widely received general assertion or rule.

The earliest writers, so far as has been shown, to use *maxima* as a substantive were Albertus Magnus and Petrus Hispanus. The former (*Post. Anal.*, lib. I. cap. ii) makes *maximae* constitute the seventh of thirteen classes of propositions which may be accepted, though they are uncertain, so that they differ widely from *dignitates*, or axioms. He says, 'Maximae propositiones opinantur esse quae non recipiuntur nisi in quantum sunt manifestae. Et putat vulgus commune et alii simplices et non periti quod sint primae ex sui veritate communicantes omnem intellectum; sicut est ista propositio, Mendacium est turpe,' &c. Hamilton quotes, but gives an unverifiable reference to, a sentence in which Albertus makes *maxima* another name for a *dignitas*. Petrus Hispanus (*Summulae*, v) says, 'Maxima est propositio qua non est altera prior neque notior'; and he divides commonplaces into two kinds, called Maxim and Difference of Maxim. This phraseology was so generally followed that it is surprising that Prantl's attribution of it to Albert of Saxony (who simply copies the *Summulae* here, almost verbatim) should have found any acceptance. Blundevile and other early writers of logic in English take the word from the *Summulae*. It was also adopted into English law. The meaning now tends to return to that used by Albertus. Kant (*Krit. d. reinen Vernunft*, 1st ed., 666) defines a maxim of reason as a subjective principle derived not from the character of the object, but from the interest of reason in such perfection of cognition as may be possible; and in the *Critic of the Practical Reason* he endeavours to make out something analogous in that sphere. In the *Logik* by Jäsche (Einleitung III) he defines a maxim as an inward principle of choice between different ends. (C.S.P.)

Maxim (legal): Ger. *Rechtsregel, Grundsatz*; Fr. *maxime de droit*; Ital. *massima giuridica*. The sententious expression of an established rule of law in a short form, which has become authoritative by long use and general approval; a legal axiom. Such a maxim has the force of law, e.g. 'Causa proxima, non remota, spectatur.'

The use of maxims is common to all

systems of jurisprudence. The leading collection is the title of the Digest of Justinian, *De diversis regulis iuris antiqui*, L. 17. See Phillimore's *Principles and Maxims of Jurisprudence*; Brown's *Maxims of English Law*; and Bouvier's *Law Dict.*, sub verbo. The latter contains about 1000 maxims, of which, say, 100 are in daily use in English and American courts. (S.E.B.)

Maximum Happiness: see GREATEST HAPPINESS.

Maximum Sensation: see LIMITS OF SENSATION.

Maximus: see ALEXANDRIAN SCHOOL.

Mazdeism [from Ahura Mazda]. Zoroastrianism. See ORIENTAL PHILOSOPHY (Persia).

Me: see I AND ME, and SELF.

Mean (1) and (2) **Median** [Lat. *medius*, middle, through Fr.]: Ger. (1) *Durchschnitt*, (2) *Mitte*; Fr. (1) *moyenne*, (2) not in use; Ital. (1) (*quantità*) *media*, (2) (*valore*) *mediano*. (1) When the term mean is used without qualification, it signifies the sum of a series of quantities divided by their number: the arithmetical mean, or average. Other kinds of mean are used, of which the geometrical mean is the most common. This is the square root of the product of two quantities.

The mean may be a representative quantity, as when it is found that the mean height of a certain class of men is 175 cm.; or it may be an approximation to a true value, as when it is found as the result of a number of measurements that the height of a man is 175·1 cm. The term average may with advantage be used for a representative value, and the term mean be confined to the precise mean.

(2) The median is the value midway in a series. In a large number of measurements following the distribution of the law of probabilities the median would coincide with the arithmetical mean. If, however, there are extreme values in one direction—as in the reaction-time where long times may occur, but times departing to the same amount from the mean in the opposite direction cannot occur—it may be an advantage to use the median. The median can also be used with qualitative differences, as the vividness of mental imagery or students' papers in an examination. Galton has used the median to advantage in such cases, the different degrees being divided into ten or four groups (deciles or quartiles). (J.McK.C.)

Galton defines the median: 'The accepted term to express the value that occupies the middlemost position. . . . The median M has three properties. The first, that the chance is an equal one of any previously unknown measure in the group exceeding or falling short of M. The second is, that the most probable value of any previously unknown measure in the group is M. Thus, if N be any one of the measures and u be the value of the unit in which the measure is recorded, such as an inch, &c., then the number of measures that fall between $(N-\frac{1}{2}u)$ and $(N+\frac{1}{2}u)$ is greatest when $N=M$. Mediocrity is always the commonest condition. . . . The third property is that whenever the curve of the scheme is symmetrically disposed on either side of M, except that one half of it is turned upwards and the other half downwards, then M is identical with the ordinary arithmetic mean or average' (Galton, *Natural Inheritance*, 41, which may be consulted also for mean and cognate conceptions). See MID-, and cf. ERRORS OF OBSERVATION. (J.M.B.)

Mean (in ethics) [Gr. equiv. μεσότης]: Ger. (*rechte*) *Mitte*; Fr. (*juste*) *milieu*; Ital. *mezzo*. That intermediate condition, removed alike from excess and from defect, which has been held to characterize virtuous or moral activity.

This conception occupies a central place in Aristotle's doctrine of virtue; but, in giving it that place, Aristotle only defined and rendered exact a conception which had become traditional. Greek views of life and art were from early times ruled by the conception of measure; the praise of moderation is found in Homer, and is a commonplace of the Seven Sages. Numerical definiteness was given to the same conception by Pythagoras, who seems to have identified the infinite or unmeasured with evil. In the *Politicus*, and still more prominently in the *Philebus* of Plato, the conception of measure is of fundamental importance, so that (as Sir A. Grant says) 'words like μετριότης and συμμετρία became naturally appropriated to express excellence in life and action.'

Through his conception of the mean Aristotle attempts to define the due moderation in which virtuous activity consists. But his conception is not merely quantitative. It is not the absolute or arithmetical mean (μέσον τοῦ πράγματος). This latter (which, as between two quantities, is equal to half their sum) has no place in morals. Virtuous action is a mean 'relative to us' or to the agent—τὸ μέσον τὸ πρὸς ἡμᾶς. It is not determined merely by abstract considerations, but is similar in character to the perfect harmony displayed in a work of art. Every morally

virtuous habit or action is a mean between opposed extremes (which are vicious); but its distance from these extremes is not a matter of arithmetic, but is relative to a man's nature, and is determined rationally in accordance with the judgment of the man of moral insight (*φρόνιμος*). Further, Aristotle himself asserts that while the doctrine of the mean expresses the law of virtue, yet viewed in relation to the good, virtue is altogether opposed to vice, and is therefore, in this sense, an extreme. The doctrine of the mean—*le juste milieu*, 'the golden mean' as it has been called—may thus be said to express the aesthetic aspect of virtue or goodness. Aristotle's own statements might have guarded him from the misinterpretation to which Kant gave currency in saying that Aristotle made only a quantitative distinction between virtue and vice. (W.R.S.)

Mean Error: see ERRORS OF OBSERVATION, and PSYCHOPHYSICAL METHODS.

Mean Gradation (method of): see PSYCHOPHYSICAL METHODS.

Mean Variation: see ERRORS OF OBSERVATION. Cf. also PROBABILITY, and VARIATION (statistical treatment of).

Meaning [Gothic *munan*, Ger. *meinen*, to think]: Ger. *Sinn*, *Meinung* (OPINION, q.v.); Fr. *sens*; Ital. *senso*. A NOTION (q.v., sense 1) considered as having more remote bearings and relationships necessary to its adequacy, yet without abstracting from the image (see NOTION, sense 2) and without reference to the conative value of the notion (cf. INTENT). See TERMINOLOGY, English, 'Meaning,' for a further note on the foreign equivalents. (J.M.B., G.F.S.)

Meaning (in logic and grammar): see SIGNIFICATION, and UNIVERSE (in logic). Cf. SEMANTICS, and SIGNIFICS.

Meaning (in philosophy): see WORTH.

Means (to ends): Ger. *Mittel*; Fr. *moyens*; Ital. *mezzi* (*al fine*). Those end-states of voluntary determination which enter as elements into the voluntary determination of a larger end-state or terminus.

The phrase 'means to an end' denotes the psychological fact that while consciousness is pursuing the means, it is as elements in a larger whole which consciousness is also pursuing. Cf. END-STATE, and TERMINUS. (J.M.B., G.F.S.)

Measure of Precision: see ERRORS OF OBSERVATION.

Measurement [Lat. *mensura*, a measure]: Ger. *Messung*; Fr. *mesure*; Ital. *misurazione*. The determination of a magnitude in terms of a standard unit. Cf. UNITS OF MEASUREMENT, and NUMBER (concept of).

Exact science consists of measurements, and all sciences as they advance become increasingly quantitative. The fundamental UNITS (q.v.) of physical science are of space (size and direction), of time, and of mass (or energy). Counting is sometimes regarded as a kind of measurement, and a ratio is the basis of all measurement. The place of measurement in psychology is still an open question. Kant held that only the time of mental processes could be measured. Fechner attempted to measure their intensity, and more recently their extensity has been regarded as measurable. Could psychology measure these three magnitudes and count (i.e. collect statistics), it would have the same field for quantitative research as physical science. It has been claimed that only physical measurements are made in the psychological laboratory, but it may be replied that at all events mental processes are functions of the quantities measured.

These cases may be taken as illustrative of the following general principles:—

(1) That which is the subject of measurement is not a concrete object, but an attribute or condition associated with the object.

(2) This attribute or condition must depend upon some cause or agency susceptible of division into like parts which can, without ambiguity, be added to each other.

(3) The attribute or condition must be capable of definition without leaving any doubt as to the method by which it is to be measured. Otherwise, different modes of measurement may lead to different and inconsistent results.

Literature: WUNDT, Logik, IV. Absch., I. Cap. (2nd ed.); VENN, Empirical Logic; JEVONS, Princ. of Sci.; EVERETT, Units and Physical Constants. (J.McK.C.)

Measurement (principles of). The definitions of a concept *qua* object and *qua* magnitude or mathematical quantity should be sharply distinguished, and much confusion has arisen through assuming that the definition of a concept must include the definition of its measure as a quantity.

For example, the definition of a line is distinct from that of the word length, which expresses the magnitude of the line. Euclid defines a triangle in such a way as to imply that its measure is its area, when, in fact, the perimeter might equally be taken as the

measure. A bar of iron may be measured by its mass, its volume, or its length. Which measure we shall take is logically a matter of arbitrary definition, and, practically, a question of convenience. The measurements of temperatures by two thermometers of different materials cannot be brought into agreement through the entire range of observable temperatures. It is therefore desirable, in using any concept as a quantity, always to indicate what the nature of the quantity is, as lines of equal length, triangles of equal area, instead of equal lines and triangles.

In order that a concept may be measured as a mathematical quantity without ambiguity, it is essential that the special attribute by which we measure it should be conceivable as made up of discrete parts, admitting of unambiguous comparison *inter se*, with respect to their equality or difference of magnitude. The simplest case is that of a straight line, whose length we conceive to be made up of distinct metres, centimetres, millimetres, or other units taken at pleasure, each of which can be determined by bringing it into coincidence with a movable measure of the designated length. Quantities of heat may be measured on the same system. But such is not the case with increments of temperature. Were it a universal rule that equal quantities of heat produce proportionate increments of temperature in all bodies, there would be no difficulty in measuring temperature by quantities of heat. But such is not the case, so that the absolute equality of increments of temperature has to be defined by thermodynamic considerations.

A more complex, but very instructive case, showing how the relation of equality between magnitudes is a matter of definition, is afforded by light, or, as the writer prefers to call it, radiance in general, whether visible as light or not. The intensity of a homogeneous ray emanating from a point and falling on an eye is capable of unambiguous definition, because equal quantities of radiance may be added without limit. Still, the measure will be definite only for a given eye at a given distance with a fixed opening of the pupil. If the distance increases, the apparent intensity of the radiance diminishes; it will be different with different eyes; it will vary with the diameter of the pupil of the same eye.

Radiance may be measured by two effects: effect on the eye, and quantity of energy conveyed by the ray. These will give accordant results in the case of any one homogeneous ray. But if rays of different wave length be compared, equality of optical effect will not correspond to equal quantities of energy. (S.N.)

Measurement Formula (psychophysical): see FECHNER'S LAW.

Mechanical [Gr. μηχανή, a machine]: Ger. *mechanisch*; Fr. *mécanique*; Ital. *meccanico*. A term used, in antithesis to organic and teleological, to describe any theory which proposes to eliminate final causes from philosophy, and to explain all phenomena as the necessary outcome of the general laws of matter in motion; and also applied to the world as thus explained. That which is strictly mechanical is called a machine or a mechanism. (A.S.P.P.–J.M.B.)

The term is used by Aristotle, and maintained itself during the middle ages, but the philosophical opposition between a mechanical and an organic or teleological view of the universe associates itself with the term only in modern times. Descartes' saying, 'Give me matter, and I will construct the world'—including in the world the phenomena of life, everything, indeed, except the *res cogitans* in man—formulated the protest of modern science against the 'forms' and inner powers of scholasticism. Boyle, one of the most enthusiastic apostles of 'the new philosophy,' expressly uses the term mechanical to describe the new view (cf. his treatise on *The Excellence and Grounds of the Mechanical Philosophy*). It is freely used in the same reference by Berkeley in *Siris*, who maintains, however, that 'the mechanical philosopher inquires properly concerning the rules and methods of operation alone, and not concerning the cause; forasmuch as nothing mechanical is, or really can be, a cause' (*Siris*, § 249; cf. §§ 236, 247). Boyle himself did not deny that the mechanical philosophy required to be supplemented by 'an inquiry into the final causes of natural things.' But Spinoza, in his passionate polemic against the idea of end, uses the term mechanical to denote the true and complete explanation as opposed to explanation by means of supernatural or miraculous agency. It is significant that the example he takes is the frame of the human body, which has furnished so many 'arguments from design.' The common run of thinkers, he says, 'ubi corporis humani fabricam vident, stupescunt, et ex eo, quod tantae artis causas ignorant, concludunt eandem *non mechanica sed divina vel supernaturali arte* fabricari, talique modo

constitui ut una pars alteram non laedat' (*Ethica*, i, Appendix). Leibnitz's philosophy is a systematic attempt to give free scope to the scientific demand for mechanical causation, and at the same time to do justice to the philosophical demand for teleological explanation which Aristotle and the older philosophy had striven to satisfy. *Causae efficientes pendent a finalibus* may be taken as the motto of his thinking. In a not dissimilar spirit, Kant distinguishes between the mechanical causality which governs nature or the world of phenomena, and the free ethical causality of 'the realm of ends' of which man's reason and will constitute him a citizen; while Lotze declares, in the spirit of Leibnitz, that the aim of his philosophizing is 'to show how absolutely universal is the range of mechanism, and at the same time how completely subordinate the significance of the function which it has to fulfil in the structure of the world' (Introd. to the *Microcosmus*). Cf. the discussion of the supposed antithesis between natural selection, as mechanical, and teleology given under HEREDITY, and see NATURALISM (1).

In biology: mechanism is opposed to vitalism, and in more recent controversy to neovitalism, as in the term DEVELOPMENTAL MECHANICS (q. v.), in which morphological changes are treated from the strict point of view of cause and effect.

Literature: EUCKEN, Gesch. u. Krit. d. Grundbegriffe d. Gegenwart; JANET, Final Causes; TRENDELENBURG, Hist. Beitr., ii, Ueber den letzten Unterschied der philosophischen Systeme; WARD, Naturalism and Agnosticism. (A.S.P.P.)

Mechanical Equivalent (of heat): Ger. *mechanisches Aequivalent*; Fr. *équivalent mécanique*; Ital. *equivalente meccanico*. The amount of mechanical work that must be expended in order to produce a unit of heat; generally the amount of energy which, by its disappearance, will create a unit of heat.

The equivalent is commonly expressed in terms of WORK (q. v.), the most convenient method of determination. See also ENERGY. (S.N.)

Mechanics [Gr. *μηχανικός*, pertaining to mechanics]: Ger. *Mechanik*; Fr. *mécanique*; Ital. *meccanica*. The science which treats of the effects of force in causing motion or equilibrium.

Theoretical mechanics: the science of mechanics treated in a general way, solely with regard to the principles involved.

Applied mechanics: the application of the laws of mechanics to practical purposes, such as the strength of materials and the working of machinery. See also MECHANICAL. (S.N.)

Mechanics of Ideas: see MECHANISM (of mind), and HERBARTIANISM.

Mechanism: see MECHANICAL.

Mechanism (of mind or ideas): Ger. *Mechanismus*; Fr. *mécanisme*; Ital. *meccanismo*. That explanation of mental process which traces it to the uniform behaviour of certain relatively simple and homogeneous elements, after analogy with particles of matter in motion.

The term was given currency by Herbart, who essayed to work out a 'Mechanik der Vorstellungen,' in which the rise and fall (Steigen und Sinken) of ideas were accounted for in terms of physical and mechanical principles. The term is not good, since it lends itself to interpretation in terms of physical analogy. (J.M.B.–G.F.S.)

Mediacy: see IMMEDIATE AND MEDIATE.

Mediacy or **Mediation** (Vermittelung): see HEGEL'S TERMINOLOGY, IV, V.

Median: see MEAN, and MID-.

Mediate: see IMMEDIACY AND MEDIACY, IMMEDIATE AND MEDIATE, (mediate) INFERENCE (2), MEDIATE (in theology), and MEDIATION.

Mediate (in theology) [Lat. *mediatus*]: Ger. *vermittelnd*; Fr. *médiat*; Ital. *mediato*. In religious thought, a term which characterizes the indirect agency of God in relation to man and the world. See MEDIATION.

According to the prologue of St. John's Gospel the creation of the world is mediated by the Divine Logos, while according to the Book of Genesis the development and organization of the world is mediated by the Holy Spirit. In the Christian scheme the salvation of man is mediated by the Divine Logos in the incarnation, the atonement, and the process of redemption. The idea of mediate agency is found in pre-Christian philosophy, especially in the system of Philo of Alexandria, who conceives God as purely transcendent and introducing subordinate beings or Logoi to mediate his agency in the world. (A.T.O.)

Mediation [Lat. *mediatio*]: Ger. *Vermittlung*; Fr. *médiation*; Ital. *mediazione*. (1) The mode by which a transcendent Deity is enabled to produce effects in the world without being himself the immediate agent of these effects.

(2) In Christian theology: that agency of Christ as revealer and atoner, by and through which man is redeemed from his ignorance and sin, and becomes reconciled with God.

The germ of the notion of mediation is contained in the Hebrew conception of Jehovah, and also in the Greek Logos. It became explicit in the Alexandrian thought of Philo, whose highest Logos was represented as performing the office of mediator between God and the world, thus making it possible for God, who is conceived in a purely transcendent fashion, to produce effects in the world without being contaminated by its evils. Mediation is the central idea in the Christian doctrines of atonement and redemption.

Literature: see references under ATONEMENT, and LOGOS. ZELLER, Philos. d. Griechen, Pt. III (1869); KIFERSTEIN, Philos. Lehre v. d. Göttlichen; HEINZE, Lehre v. Logos (1872). (A.T.O.)

Medical Psychology: Ger. *medizinische Psychologie*; Fr. *psychologie médicale*; Ital. *psicologia medica*. The consideration, mainly from a medical point of view, of abnormal and pathological mental states, and their symptoms.

With this meaning the term 'psychological medicine' (see Bucknill and Tuke, *Manual of Psychol. Med.*, 1858, and later Tuke, *Dict. of Psychol. Med.*, 1892) is also used. British and French associations for the study of the insane bear the name 'Medico-psychological Association.' Lotze, in his *Medicinische Psychologie* (1852), included what was later termed physiological psychology, or mental physiology (Carpenter and Maudsley). The term is closely related to psychiatry, psychopathology, abnormal psychology, and PATHOLOGY (mental) (q.v.), especially the last-named. (J.J.)

Meditation [Lat. *meditatio*]: Ger. *Nachdenken*; Fr. *méditation*; Ital. *meditazione*. A somewhat loose synonym for REFLECTION (q.v.). Not a technical term. (J.M.B.)

Medium [Lat. *medium*, middle = Gr. *μέσος*]: Ger. *Medium*; Fr. *médium*; Ital. *medium, medio*. A term applied, in connection with the phenomena of ANIMAL MAGNETISM (q.v.), HYPNOTISM (q.v.), and SPIRITUALISM (q.v.), to a person whose speech and action are supposed to be controlled by a foreign personality or by a disembodied spirit, and who speaks from knowledge gained in some supernatural manner; also called a 'sensitive.'

Some spiritualistic and other mediums claim the power of acting upon matter in violation of ordinary physical laws; others claim to be the means of communication between the departed and the living. As such communications are frequently given while the medium is in an abnormal, semi-conscious condition (usually termed TRANCE, q.v.), the explanation of the phenomena of mediumship may possibly be sought in a psychological analysis of such quasi-abnormal conditions. That many of the claims and exhibitions of alleged mediums are little more than vain pretence and more or less clever deceit has been abundantly proved; but in many other cases the phenomena must be considered genuine.

A case which may be cited as a typical form of the phenomena as exhibited in recent years is that of Mrs. Piper (cf. *Proc. Soc. Psych. Res.*, xii–xv). For the various manifestations of mediums in SPIRITUALISM and in TRANCE conditions see those terms. Anthropologically, the medium is variously represented in the Shaman or medicine man, in oracles, and in superstitions, customs, and beliefs relating to the influence of the dead upon the living. See VOODOO, FETICH, and MAGIC. Cf. general treatment in Lehmann, *Aberglaube und Zauberei*, and the citations under SPIRITUALISM. (J.J.)

Medium (in philosophy): see TERTIUM QUID, MILIEU, and ENVIRONMENT.

Megalomania [Gr. *μέγας*, great, + *μανία*, madness]: Ger. *Megalomanie*; Fr. *mégalomanie*; Ital. *megalomania*. A special form of delusion occurring in certain forms of insanity (cf. in particular, MANIA, and general PARALYSIS), in which the patient feels himself elated, his energies overflowing, his mind filled with a wealth of brilliant thoughts, his strength gigantic, his possessions vast, his achievements remarkable, his powers supreme, &c.

To keep pace with these exalted notions he invents the most brilliant accounts of his endowments and possessions. He is a genius among mankind, can speak a score of languages, has a wonderful voice, the skill of a Rembrandt; he has estates in all parts of the world, has thousands of servants, is about to establish vast mercantile operations; he has distinguished himself in battle, is a hero among the fair sex, is about to assume command of armies; or he has great schemes for making everybody wealthy, for reforming mankind, and so on indefinitely. The notions often assume the most extravagant forms, particularly as the brain disease advances. The megalomaniac poses as an emperor, as the son of Venus, as the ruler of the earth, as God himself. The patient is absorbed in these exalted reflections, which he is ever ready to extend and expand, and does not realize the contradiction between his actual surroundings and the ideal world in which he lives.

Synonyms of megalomania are 'expansiveness' and 'exaltation.' Cf. DELUSION. (J.J.)

Literature: treatises on mental PATHOLOGY (q. v.), especially those of DAGONET, SCHÜLE, CLOUSTON, KRAFFT-EBING, KRAEPELIN, and BALLET-MORSELLI; also EMMINGHAUS, Allg. Psychopathol.; FRIEDMANN, Ueber den Wahn (1894). (E.M.)

Megarians: see SCHOOLS of GREECE, II.

Melancholia [Gr. *μέλας*, black, + *χολή*, bile]: Ger. *Melancholie*; Fr. *mélancolie*; Ital. *malinconia*. In its current use melancholia applies to all abnormal mental conditions dominated by depression, while formerly it was a synonym of partial insanity or MONOMANIA (q.v.). According to Pritchard, the Greek *μελαγχολᾶν* means simply to be mad, without any reference to lowness of spirits. The term was opposed to mania, and became more and more connected with gloom in the sense in which it is used exclusively to-day. Esquirol felt obliged to call the depressive insanities proper, lypémanie, in order to escape confusion. Rush uses the term Tristomania.

The varieties commonly classified are simple melancholia, stuporous, delusional, homicidal, suicidal, puerperal, acute, chronic melancholia attonita, &c. It is obvious that many dissimilar conditions are thus brought under one heading, simply because they are dominated by depression. A careful analysis leads to the recognition of more essential characteristics; but the nosological interpretation of the various types is still a topic of some controversy.

The following are the most common symptom-complexes: (1) Constitutional depression: a pessimistic temperament that is inclined to see the dark side of everything, and is led to gloominess and despondency upon slight provocation. Such moods or periods often present a temporary character in the form of more or less periodic exacerbations, which, however, in distinction from the next group, rather readily pass off with an improvement in the circumstances of the patient. Such attacks are occasionally accompanied by marked feelings of anxiety.

(2) Simple melancholia proper: an excessive or altogether unjustified depression, often accompanied by defective sleep, precordial pain or uneasiness; a susceptibility for the unpleasant and wearing aspect of things only, and a feeling of self-depreciation, of sinfulness, without insight into the unwarranted morbid nature of the condition. The patient feels himself too bad to live or to be treated kindly. There is usually a feeling of inability and indecision, and especially in the form which is merely a phase of manic-depressive insanity (see MANIA), a difficulty in thinking clearly, and a retardation or inhibition of spontaneous activity.

This may be followed by delusional elaboration; the patient comes to believe that everything, the whole world, will come to a bad end, that it is all the patient's fault; and an occasional hallucination may appear to corroborate and elaborate such feelings and thoughts. This condition is frequently accompanied by a strong affect of fear and anxiety for self and family, or suicidal impulses, or great restlessness, or again self-absorption, or retardation of all activity, leading to a form of stupor.

(3) Other forms are characterized by prolonged 'neurasthenic' malaise and a feeling of depression (frequently over moral matters), and by a great tendency to refer the feelings to influence of others, to poison, to hypnotism, to electricity, to nocturnal rape; or there are hypochondriacal complaints, frequently of an absurd character. Hallucinations are common. The whole picture is apt to have a certain resemblance to the paranoic types in later periods of life (after 35), while in earlier periods it undoubtedly belongs usually to the processes of deterioration (dementia praecox), and often presents distinct features of katatonia.

(4) Depressive delirium, together with great anxiety, vivid hallucinations, fear, desire to escape from danger, even by suicide, sometimes with remarkably good appreciation of the immediate circumstances and environment. It is apt to occur after acute diseases, in pregnancy, &c., and is at times difficult to distinguish from alcoholic delirium.

(5) As a special episode in the types (2) and (4) may be mentioned the délire de négation (délire in the broad sense of delusional state); the patient believes that he is nobody, that the whole world is imaginary, gone, burned, 'everybody dead and nobody left to tell the tale,' &c. A similar exaggeration of depressive delirium occasionally occurs in senile dementia and in general paralysis.

(6) 'Katatonic melancholia,' for which see KATATONIA. It is perhaps closely related to type (3), but usually of acute onset, with hallucinations of commands to be good, to perform simple actions that have a mystical

and symbolic meaning (spitting at a shoe, taking attitudes of prayer and poses, &c.); with catalepsy, mutism, refusal of food, stupor, often with perfect knowledge of what is going on and perfect remembrance of incidents. The occasional excitements show stereotypy of expression, and lead frequently to repetition of sentences (e. g. 'give me a dose of poison to put me out of the way quick,' repeated continually for months), or of senseless sounds or confused silly talk with reiterations (verbigeration). Rather often sudden recovery occurs, if the first attack does not lead to dementia.

The forms (1) and (2) are usually recoverable conditions of greatly varying duration, frequently belonging to the constitutional, recurring, and circular psychoses, the simple depressions being especially prone to occur in several successive generations of a family. In the circular cases, the predominance of an inhibition or retardation of movements and of thought is very striking, while the anxious and agitated forms of type (2) are especially characteristic for the climacteric period, and pass without a distinct line into the types of presenile depression with absurd hypochondriacal delusions, shallow affects, and usually poor prognosis. Many cases of type (4), as well as of (3), are processes of deterioration (dementia praecox), or, in a later period of life, of paranoic conditions.

The individual differences in a large series of cases of melancholia are so great that it would be a grave injustice to the facts to try to describe them as one condition in one connected composite picture.

Clinical experience and experimental psychology show that there are undoubtedly several distinct disease-processes which account for the differences of the above types. But definite statements as to their nature and concerning the pathological anatomy seem as yet premature.

Literature: KRAEPELIN, Psychiatrie, ii (1899), and Die klinische Stellung der Melancholie, Monatssch. f. Psychiat. u. Neurol., iv. 325 (1899); ROUBINOWITSCH and TOULOUSE, La Mélancolie (1897); TH. ZIEHEN, Die Erkennung und Behandlung der Melancholie in der Praxis, Alt's Abhandl., i (Halle, 1896); also Amer. J. of Insan., liv. 543; VALLON and MARIE, Le délire mélancolique, Arch. de Neurol. (June, 1898); TOULOUSE and VASCHIDE, Le Temps de Réaction dans la Mélancolie, Rev. Neurol., v. No. 22; E. RÜCKLE, Ist die Melancholie ausschliesslich eine Psychose des Rückbildungsalters? Diss. Erlangen (1898); G. M. ROBERTSON, Melancholia from the Psychological and Evolutionary Point of View, J. of Ment. Sci. (1890); J. K. MITCHELL, An Analysis of Three Thousand Cases of Melancholia, Trans. Assoc. Amer. Physiol. Philad., xii. 480, and J. of Nerv. and Ment. Dis., xxiv. 738 (1897); E. N. BRUSH, An Analysis of One Hundred Cases of Acute Melancholia, Brit. Med. J. (Sept. 25, 1897), and Amer. J. of Insan., liv. 241; J. SÉGLAS, Le Délire des Négations (Paris, 1896); general treatises on psychological medicine by MOREL, GRIESINGER, KRAFFT-EBING, SCHÜLE, and BALLET-MORSELLI; and a discussion in Neurol. Centralbl. (1899), 904. (A.M.–E.M.)

Melanchthon (or **Melancthon**), **Philip.** (1497–1560.) Enjoyed unusual educational advantages under the supervision of his grandfather and of Reuchlin, who translated his name Schwarzerd ('Black earth') into the Greek 'Melanchthon.' Entered the University at Heidelberg, 1510; removed to Tübingen 1512, where in 1514 he began lecturing on the classics. In 1518, declining calls to both Leipzig and Ingolstadt, he went to Wittenberg, where he was associated with Luther, who, together with the students, induced him to turn his attention to theology. He wrote and repeatedly revised the Augsburg Confession.

Meliorism [Lat. *melior*, better]: Ger. *Meliorismus*, *Theorie der Weltverbesserung*; Fr. *méliorisme* (not in use); Ital. *migliorismo*. A belief in the possibility of the improvement of the world by human effort, generally implying the further belief that such progressive improvement is a fact and even a law of evolution. (A.S.P.P.–H.S.)

The term was invented by George Eliot, in connection with the question of optimism and pessimism, to express a view which she put forward as a *via media* between these two extremes (see an article on George Eliot by Edith Simcox in the *Nineteenth Century* for May, 1881). Used by her in conversation, it was adopted by Sully in his *Pessimism* (1877), and has since become current. Sully defines it as 'the faith which affirms not merely our power of lessening evil—this nobody questions—but also our ability to increase the amount of positive good. . . . By recognizing the possibility of happiness and the ability of each individual consciously to do something to increase the sum total of human welfare present and future, meliorism gives us a practical creed sufficient to inspire ardent and prolonged endeavour' (*Pessimism*,

399). The belief connects itself with the modern theory of evolution, which it interprets in a beneficent and quasi-religious light. 'Faith in a gradual abatement of evil by the method of progressive evolution is now a favourite scientific faith: this faith may be regarded as the form which an unconsciously religious conception of the universe is assuming in professedly agnostic minds' (Fraser, *Theism*, 2nd ed., 282). Cf. Optimism and Pessimism (also for *Literature*). (A.S.P.P.)

The English meliorate and melioration (the usual form being ameliorate, from *ad* + *melioratus*) might well be used (Ger. *verbessern, Verbesserung*; Fr. *améliorer, -ation*; Ital. *migliorare, miglioramento*) in connection with meliorism. (J.M.B.)

Melissus. Lived about 450 B.C. Born in Samos. He is called a disciple of Parmenides. His work in prose (περὶ φύσεως or περὶ ὄντος), of which fragments remain, is a refutation of the Ionian Physicists. He was also victorious as a naval commander in battle with the Athenians.

Melody: see Music.

Memory [Lat. *memoria*]: Ger. *Gedächtniss, Erinnerung* (princ. in compounds) Fr. *mémoire*; Ital. *memoria*. Ideational process, so far as it takes the form of the reproduction and recognition of prior experiences in their original time order. Memory thus includes the three relatively distinguishable functions of Reproduction, Recognition, and Localization (in time). Cf. those terms.

Plato calls memory σωτηρία αἰσθήσεως (*Philebus*, 34 A). This failed to distinguish between memory proper and retentiveness in general. Aristotle, however, distinguished between φαντασία and μνημόνευμα. Hobbes defines both memory and imagination, which with him includes all mental imagery as 'decaying sense.' The word memory is used to indicate that the mental image presupposes a primary experience, which it revives. The word imagination is used to indicate that the revival is relatively faint, or, as Hobbes would say, 'decayed.' Locke says that memory is 'the power the mind has to revive perceptions which it has once had, with the additional perception annexed to them—that it has had them before' (*Essay*, Bk. II. chap. x. § 2). Hume raises the question of the difference between memory and imagination. According to him the distinction is one of degrees of vivacity. The vivacity or liveliness of an experience coincides in Hume with power to compel belief in the object of the experience. Vivacity—and therefore belief-compelling power—belongs in the highest degree to actual sensations, or, as he calls them, impressions. 'We find by experience that, when any impression has been present with the mind, it again makes its appearance there as an idea, and this it may do after two different ways, either when in its new appearance it retains a considerable degree of its first vivacity and is somewhat intermediate between an impression and an idea, or when it entirely loses that vivacity and is a perfect idea. The faculty by which we repeat our impressions in the first manner is called the memory, and the other the imagination' (*Treatise on Human Nature*, i. 193). Reid has a very good chapter on 'Theories concerning Memory' (*On the Intellectual Powers*, Essay III, chap. vii), in which he criticizes the definitions of Locke and Hume. He remarks that Locke is inaccurate in saying that the perception itself as a mental occurrence is revived. 'An ability to revive our ideas or perceptions, after they have ceased to be, can signify no more than an ability to create new ideas or perceptions similar to those we have had before' (Essay III, chap. vii. 355, Hamilton's edition). The true way of putting the case, according to Reid, is to say that the memory-idea is a thought of the same object as that which had been originally perceived. The same criticism applies to Hume. Reid also urges against Hume that he defines in a circle. 'For can we find by experience that an impression, after its first appearance to the mind, makes a second and third, with different degrees of strength and vivacity, if we have not so distinct a remembrance of its first appearance as enables us to know it on its second and third, notwithstanding that, in the interval, it has undergone a very considerable change?' (ibid. 354). 'It has been held by some psychologists that memory proper includes the representation of one's past self as agent or patient in the event or situation recalled. And this is true as regards all but the earliest human experience, at any rate; still, whereas it is easy to see that memory is essential to any development of self-consciousness, the converse is not at all clear, and would involve us in a needless circle' (Ward, art. Psychology, *Encyc. Brit.*, 9th ed., xx. 63). Cf. the topics immediately following; also Organic Memory. (G.F.S.–J.M.B.)

Recently the question of 'affective memory' has arisen for discussion. See Revival.

Literature: the works named; the textbooks of psychology (citations are made in those of DEWEY, BALDWIN, LADD, JODL, and JAMES); the Psychological Index, 1 ff.; the following topics; BIBLIOG. G, 2, *u*; EISLER, Wörterb. d. philos. Begriffe, 'Gedächtniss.' On affective memory, see URBAN, Psychol. Rev., viii, May, July, 1891, 262. (J.M.B.)

Memory (defects of). Abnormalities of memory fall readily into the two classes of excess and defect. An equally fundamental distinction is that between affections of general retentiveness and affections of special acquisition groups, i. e. classes of memories.

The nature of the case, whether mere absence of memory, distortion of memory, illusion of memory, or, again, whether temporary or permanent, periodic or progressive, is also of great importance. The most general synonym for defect of memory is AMNESIA (q. v.), which, however, when used with precision, applies only to degrees of failure of retentiveness. Paramnesia indicates a defect of distortion or illusory memory, a false recollection; hypermnesia refers to conditions of unusual exaltation of memory.

Any adequate account of defects of memory must be based upon, and developed in conformity with, an analysis of the normal functions which the term comprises. Normal memory is an expression of the functional activity of the nerve centres, whereby, on the basis of vestiges or residua established as concomitants of sense impressions, of actions, of emotions, or in brief of experience, the same or similar presentations are recognized when they recur, enter freely into combination with other remembered presentations, and may be more or less successfully summoned into consciousness by voluntary effort. Residua of some sort are thus an indispensable requisite of all acquisition, whether carried on subconsciously and automatically or with conscious intent. In the larger sense we remember how to walk as well as how to talk; we remember the use of a knife or the sound of a printed letter; we remember the odour of tuberose or the exhilaration of a toboggan slide; we remember, too, what we liked in our childhood, or the scenes of former travels; we remember that *bœuf* is the equivalent of ox, or that 622 is the date of the Mohammedan Hegira. It is obvious that memory—and with it defects of memory—comprises a very heterogeneous assemblage of processes, which reflect the variety of psychological functions involving the memory factor.

A defect of memory is an expression of the incapacity of a group (or of certain groups) of centres to exercise their normal functions, or of a tendency which they show to function in an abnormal manner. Thus considered, defects of memory may be (1) general, involving (*a*) a defective capacity of a nervous centre (or centres) to establish residua or dispositions of memory; in this condition an object not in the range of vision is forgotten, an action just performed is as though it had not been done at all, and may be repeated again and again without becoming familiar; (*b*) or it may be that this power is exalted so that impressions reappear in memory with unusual completeness and vividness. Along with normal power to revive in memory current acquisitions, the defect may be (2) special: a loss of certain experiences from the memory accumulations of the past; and this again either temporarily or permanently. After an accident, the experiences of minutes or hours or days preceding the moment of the accident are often forgotten; the recovery from fever leaves a blank in the patient's memory continuum; in cases of periodic changes of personality and of hypnotic states, the subject in one period is ignorant of his experiences in the other, and it may be to such an extent that manual facility and other automatic accomplishments as well as intellectual acquisitions are involved. (3) It may be that only certain groups of images fall away: one patient loses the power to recognize printed letters or to recall the manner of making the sounds which they indicate, while retaining the power to speak and to understand conversation (see SPEECH AND ITS DEFECTS); another loses the memory of a foreign language while retaining his vernacular; another loses the memory for substantives or proper names, and so on. (4) The abnormality may consist in a false localization in time, of false concomitants or order of the same; of imaginary additions to real events; of the entire illusory recollection of what has not been experienced, the apparent familiarity of what is really novel, and the like.

Briefly, the memory functions may be altered in regard to their 'storing' or retentive functions; in regard to their reproductive functions (the recorded impressions in part or in whole, for shorter or longer periods, are not recalled or not recognized); or, finally, the reproductive or recognitive function may be inadequately or in some one of many ways perversely performed.

No adequate account of memory defects along the line of this classification (which may be characterized as an internal classification depending upon variations from normal functional activities) has as yet been made, but it is clear that the familiar cases of such defect are readily interpretable on this basis.

(1 *a*) may be termed acquisitional amnesia, and occurs both temporarily and permanently in imbeciles, in dementia, and as the result of serious shock or injury. As elsewhere, certain groups of centres may be more closely involved than others. (1 *b*) represents hypermnesia; it may be exhibited as unusual scope of memory (arithmetical prodigies, chess-playing virtuosi like Zuckertort or Pillsbury playing twenty games at once and blindfolded, considered as abnormal); or unusual celerity, accuracy, or vividness; or may combine these qualities in various proportions. As before, such hypermnesias may be generally distributed, but are more apt to affect special groups of centres. Group (2) constitutes the ordinary special amnesias, temporary, or permanent, or periodic, and may affect subconscious and automatic, or (more usually) voluntary acquisitions alone. They are related to defective nutritional or generally degenerative conditions of cerebral centres, and are apt to involve more or less serious impairments of consciousness. See PERSONALITY (defects of), and SUBCONSCIOUS. (3) represents the various partial amnesias, while (4) represents the equally varied paramnesias and illusions of memory.

Regarding illusions of memory, many fall entirely within the bounds of the normal. Forgetting is as normal as remembering, and misremembering is a form of forgetting. In experiments upon memory as well as in studies of mal-observation, errors of memory are usually classified as those of omission, of substitution, of transposition, and of addition. Material may be omitted, may be falsely localized, may be confused with other data, and extraneous matter may be introduced. The normal laws of association and specialization of memories are competent to account for such errors in general outline, though not in detail. In addition, there are more obscure illusions, which have been classified (Burnham) as (*a*) simple paramnesia or the confusion of the results of imagination with true memory images; in this way habitual liars come to believe their own inventions, and the systematic delusions and accusations of the insane may find a starting-point in a similar pseudo-reminiscence (Kraepelin); (*b*) identifying paramnesia, also termed double memory, which is the above-mentioned false familiarity, the 'has-been-experienced-before' consciousness; this too occurs in normal persons, and may occur in insanity with unusual fullness of detail, the patient feeling that the thing about to be done has been done before, and that he can anticipate what is to occur next; (*c*) suggestive or associating paramnesia, in which actually occurring impressions arouse false reminiscences; in this way suggestions that one has experienced things which have not been experienced are accepted, and false testimony is produced frequently by children (MOTET, cited below); it may also be that certain types of presentiments are really cases of similar pseudo-reminiscences.

The more usual method of classification approaches the subject externally, on the basis of the character of the symptoms; and such a classification, while not antagonistic to the one just outlined, results in a different exposition. It is best represented by Ribot, who proceeds as follows:—

(1) General amnesia, which is (*a*) temporary, or (*b*) periodic, or (*c*) progressive, or (*d*) permanent, and is either congenital, as in idiocy, or acquired, as in severe dementia; (2) partial amnesia; (3) hypermnesia.

With regard to the occurrence of memory defects, it may be noted, in addition to the illustrations above cited, that temporary defect may be produced by fatigue, by anxiety, &c.; it appears as a marked characteristic of epileptic seizures (see EPILEPSY), as an effect of shock or injury to the brain, and as the result of the action of drugs (see PSYCHIC EFFECT OF DRUGS). More permanent amnesias occur in the general debility of illness or old age, and in profound affections of the brain, as in mania, melancholia, dementia. In hysteria occur at times peculiar periodic dislocations of the memory basis, which tend to divide the experiences of the patient into relatively independent and unrelated memory systems (for details see references under HYSTERIA, and defects of PERSONALITY). Typical cases of progressive amnesia (and the same is true of partial amnesia) are recorded in connection with aphasic disorders and in general paralysis. Hypermnesia occurs as an individual endowment, and in response to the stimulation of drugs, of fever, of hypnotic suggestion, and states of normal or abnormal mental excitement. The occurrence of some

one form of unusual special memory in combination with mediocre general ability, or even with imbecility, has been noted.

Literature: Ribot, Diseases of Memory (Eng. trans., 1882); Guillon, Les Maladies de la Mémoire (1897), a monograph on hypermnesia, with bibliog.; Patrizi, Memoria e Oblio (1890), with bibliog.; Sully, Illusions, chap. x; Burnham, Amer. J. of Psychol., ii. 39, 225, 431, 561 (with bibliog., 431 on abnormal memory); Kraepelin, Arch. f. Psychiatrie, xvii. Heft 3, xviii. Hefte 1 and 2; Royce, Mind, xiii. 244; Hodgson, Proc. Soc. Psych. Res., iv. 381; Davey, ibid., 405; Motet, Les faux Témoignages des Enfants (1887); Osborn, Illusions of Memory, North Amer. Rev. (1884), 476; Pardo, I Disturbi della Memoria (1899); Sollier, Troubles de la Mémoire (1892). General works on Memory (q.v.) often contain data regarding abnormal memory. See also under Speech and its Defects. (J.J.)

Memory (experiments on). Four experimental methods of investigating memory are sometimes distinguished: those of 'reproduction,' 'identification' ('recognition'), 'selection' ('comparison'), and 'description.' All investigations so far published, however, may be classified under the first two heads. Widely defined, description belongs to reproduction, and comparison may be considered a function of recognition. (E.B.T.–J.M.B.)

It is clear that various bases of classification of problems and literature might be taken. Thus one might arrange them under the sense-organs to which the stimuli employed appeal. A good classification is that in terms of attribute of stimulus, under five heads (cited with authorities):—

(1) Time (Paneth, &c.); (2) Space (Baldwin, &c.); (3) Intensity (Weber, &c.); (4) Quality (Wolfe, &c.); (5) Composition (Ebbinghaus, &c.). (E.B.T.)

The methods have recently been classified and criticized. Kennedy (*Psychol. Rev.*, v. 477) reviews the subject and finds much confusion from the failure to discriminate the methods with exactness. In his opinion the three methods distinguished by Baldwin (under the terms reproduction, identification, and selection), and suggested and used also by Binet (under the terms reproduction, recognition, and comparison), are psychologically distinct from one another. These writers hold that the circumstances of 'recognition'—as between mere identification of a recurrent stimulus and its 'selection,' with 'comparison,' from others—are all-important, and justify the careful separation of these methods (cf. the general statement by the present writer, *Story of the Mind*, 138 ff.). The method of 'description' is hardly a memory method, since it really gives exercise to association and apperception (in its wider sense), as Ebbinghaus clearly shows in his attempt to give it exactness (*Sitzber. d. 3ten Int. Cong. d. Psychol.*, München, 1896). (J.M.B.)

The psychological basis of Kennedy's classification is criticized by Bentley (*Amer. J. of Psychol.*, xi. 1), who distinguishes between reproduction and recognition, making the other methods mentioned sub-types of one of these; he adds a third method, 'recall and comparison,' which takes account of the memory image. Reproduction and recognition possess quantitative value chiefly; recall and comparison, qualitative as well. (E.B.T.)

Literature: more general titles are Burnham, Amer. J. of Psychol., ii. 39, 225, 431, 568 (with bibliog.); James, Princ. of Psychol., 'Memory'; Kennedy, Psychol. Rev., v. 477 (bibliog. to July, 1898); Bentley, Amer. J. of Psychol., xi. 1 (bibliog. to 1899); Baldwin, as cited above. Researches classed roughly by methods (the stimulus is also given in some instances) are:—

(1) *Reproduction and Description*: Ebbinghaus, Ueber d. Gedächtniss (1885); Müller and Schumann, Zeitsch. f. Psychol., vi, Syllables; Paneth, Centralbl. f. Physiol., iv, Time Intervals; Münsterberg, Beitr. z. exper. Psychol., iv, 'Muscular' Retention, and Influence of Interval on Eye and Arm Movement; W. G. Smith, Mind, N.S., iii, Conditions of Retention; Barth, Diss. Dorpat (1894), Ortssinn; Bolton, Amer. J. of Psychol., iv, Digit Series read and written; Kirkpatrick, Psychol. Rev. i, Objects, and Written and Spoken Words; Lewy, Zeitsch. f. Psychol., viii, Measurement of Visual Area, and Haptic Localization; Jacobs and Bryant, Mind, O.S., xii. 75, 'Span' of Memory; Warren and Baldwin, Proc. Amer. Psychol. Assoc., ii (1893); Baldwin and Shaw, Psychol. Rev., ii. 236; Warren and Shaw, Psychol. Rev., ii. 239 (the last two citations are also in Princeton Contrib. to Psychol., i. 2), Visual Square Size; Binet, Introd. à la Psychol. expér. (1894), and Rev. Philos., xxxvii, Numerals, Lines, &c.; T. L. Smith, Amer. J. of Psychol., vii, Muscular; Schneider, Diss. Dorpat (1894), Muscular; Cohn, Zeitsch. f. Psychol., xv, Co-operation of Partial Memories; Philippe, Rev. Philos., 1897, Images of

Objects; WOLFE, Amer. J. of Psychol., ix, 1898, Size of Objects, &c.

(2) *Recognition, Identification, Selection, Comparison*: E. H. WEBER (1846), Visual Lengths and Weights; WOLFE, Philos. Stud., iii, Tones; LEHMANN, Philos. Stud., v, Grays and Scents; MÜNSTERBERG, Psychol. Rev., i, Colours and Numbers in Duplicate Series; BIGHAM, Psychol. Rev., i, Visual and Auditory Stimuli, Effect of Filled and Empty Intervals; BALDWIN, SHAW, and WARREN, Princeton Contrib. to Psychol. (also as cited above), i (1895), Visual Square Size; SCHUMANN, Zeitsch. f. Psychol., i, Series of Sounds; LOEWENTON, Diss. Dorpat (1893), Position on the Skin; RADOSLAWOW-HADJI-DENKOW, Philos. Stud., xv, Visual Distances. (E.B.T.–J.M.B.)

Memory Image: see IMAGE. The form 'Memorial Image' is not recommended. (J.M.B.–G.F.S.)

Memory Time: see REACTION TIME.

Mencius [Lat. form of Chinese *Mŭng-tse*: *Mŭng*, the philosopher]. (b. cir. 371 B.C.) With Confucius, one of the two greatest Chinese philosophers. See ORIENTAL PHILOSOPHY (China).

Mendelssohn, Moses. (1729–85.) Studied the Bible, the Talmud, and Maimonides with early zeal. Became (1750) tutor in a rich Jewish family in Berlin, and in 1754 book-keeper in the firm. Became an intimate acquaintance of Lessing. In 1763 received a prize from the Academy of Berlin. Died in Berlin.

Meninges: see MENINX.

Meningitis: Ger. *Hirnhautentzündung*; Fr. *méningite*; Ital. *meningite*. Diseased conditions of the membranes (see MENINX) investing the brain (leptomeningitis, pachymeningitis). Cf. BRAIN (Glossary). (H.H.)

Meninx [Gr. *μῆνιγξ*, membrane]: Ger. *Hirnhaut*; Fr. *méninge*; Ital. *meninge*. One of the three membranous envelopes of the central nervous system. It is chiefly used in the plural (meninges) and in composition. Cf. BRAIN. (H.H.)

Mental Blindness and Deafness: see BLINDNESS, and DEAFNESS (mental or psychic).

Mental Chronometry: see REACTION TIME.

Mental Development: Ger. *seelische Entwickelung*; Fr. *développement mental*; Ital. *sviluppo mentale*. The series of processes through which the individual mind naturally passes from birth to death.

Development is here, as in its biological use, contrasted with EVOLUTION (mental, q.v.). It is the ontogenetic as contrasted with the phylogenetic mental process. The questions which come up in connection with mental development are those of one branch of GENETIC PSYCHOLOGY (q.v.) as contrasted with analytic psychology; that is, they are questions of the antecedents of mental states and of the laws of change from one stage of mental life to another. In general, the distinction is analogous to that between morphology and physiology. Certain questions, however, as in biology, belong to the genetic as such, and involve the relation of development to evolution; see RECAPITULATION, REGRESSION, ATAVISM, VARIATION. Among the problems peculiar to mental development, on the other hand, some of the more important are: the genetic relation of the motor to the sensory processes; the original forms of consciousness, with the ultimate modes which its process takes on; the law of the relation of mind to its environment, both physical and social; the relation of instinctive endowment to acquisition and GROWTH (q.v.); the methods of mental ACCOMMODATION (q.v.); HABIT (q.v.) and its relation to accommodation; the interaction of the primary functions and the order of the appearance of the relatively new stages which each of them successively assumes; the tracing of the constant factors, and their relation to the variations which introduce new departures, &c. Most of the problems of philosophical biology, in fact, find analogies in mental evolution and development; and in many cases the psychological solution is necessary to the biological solution, since the problem is really one with two faces.

Certain departments of the subject have been marked off in recent years and in part developed. We have CHILD PSYCHOLOGY (q.v.) treated as a more or less separate subject, and SOCIAL PSYCHOLOGY (q.v.) similarly. The influence of the genetic point of view is permeating more and more the treatment of general or analytic psychology. It is being seen that analysis is never adequate if it be purely dissection, for the actual statement of mental process must include more or less change and development. Mental development in the animals is treated in COMPARATIVE PSYCHOLOGY (q.v.).

Literature: BIBLIOG. G, 1, *e*, *f*; titles given under the topics cited above; Psychological Index, in loc., 1 ff. Of recent works, JODL, Lehrb. d. Psychol., and STOUT, Manual of Psychol., are written from a genetic point of view. BALDWIN'S Ment. Devel. (2 vols.)

is devoted explicitly to this subject proper and to EVOLUTION (mental, q. v.). (J.M.B., G.F.S.)

Mental Disease: see PATHOLOGY, and the various special names of mental disorders. Cf. PSYCHOSIS, and NEUROSIS.

Mental Energy: see ENERGY (ad fin.), and cf. SOCIAL LOGIC.

Mental Evolution: see EVOLUTION (mental).

Mental Pathology: see PATHOLOGY (mental).

Mental Science: see PSYCHOLOGY, and cf. MORAL SCIENCES.

Mental Type: see TYPE (mental).

Mental Unity: Ger. *Einheit des Bewusstseins*; Fr. *unité de la conscience, unité du moi*; Ital. *unità della coscienza.* The apparent oneness of the individual mind.

Theories of mental unity are abundant both in psychology and in metaphysics. The three most prominent theories are: (1) the intuitional, which holds not only to the psychological immediacy of the consciousness of unity, but also to its rational validity as a datum of thought; (2) the empirical theory, which makes the consciousness of unity an experiential product: that is, it denies that it is psychologically IMMEDIATE (q. v.), although admitting that it is psychically so; (3) genetic theories, which hold that unity is the form of organization of conscious contents at any stage of mental development; not a constant datum or a content at all, but a changing aspect of conscious process. On this view the unity of effort (conation) is different from the unity of feeling or cognition. A newer view under this head finds mental unity in the consciousness of the motor dispositions or habits which represent practical accommodations, or adjustments of attention.

Conscious unity is often confused with consciousness of self. But so far as self is a content, it has, rather than is, unity. Only the theory which makes the subject-self, or I, the form of organization of knowledge could identify this with the consciousness of unity.

The organization theory of the consciousness of unity is supported by the cases known as dual or MULTIPLE PERSONALITY (q. v.), in which division of the content of consciousness results in the appearance of different quasi-personalities, each with its own consciousness of unity. (J.M.B., G.F.S.)

Besides the holders of the intuitional theory mentioned above, many idealistic writers find in the consciousness of unity an *a priori* form or prerequisite to all experience, and argue to a noumenal or transcendental principle of unity, a soul or self. The scholastics made unity and simplicity attributes of the soul. Descartes' 'cogito ergo sum' is followed by Kant's 'ich denke,' a principle of the 'transcendental unity of apperception'—a function of the transcendental self. Cf. KANT'S TERMINOLOGY (glossary). Kant holds, as to empirical unity, however, that the identity of consciousness is only a formal condition of thought, and does not prove the numerical identity of the subject (Third Paralogism).

In later philosophy, Leibnitz's MONAD (*μόνος*, one) and Herbart's REAL are principles of unity (see those terms). Lotze finds in mental unity in the midst of change the category (M) of explanation of the world. Indeed, most spiritualistic and idealistic philosophy is from the start an interpretation of experience and of the world as a system in some way resting upon mental unity. Cf. the psychological conceptions INDIVIDUAL, and IDENTITY.

Literature (psychological): appropriate passages in the psychologies; ARDIGÒ, L'Unità della Coscienza, Op. Filos., vii. (1898); MAUDSLEY, Mind, xvi. 161; citations from German authors in EISLER, Wörterb. d. philos. Begriffe, 'Einheit'; works on metaphysics generally. (J.M.B.–K.G.)

Mentality [Lat. *mens*, mind]: Ger. *psychische Beschaffenheit*; Fr. *mentalité*; Ital. *mentalità.* The distinctive characteristics of mind or conscious life abstractly considered. (G.F.S.–J.M.B.)

Applied particularly to the different grades of mental endowment, as exhibiting more or less (higher or lower) mentality. Cf. SUBCONSCIOUS. (J.M.B.)

Mercantile System: Ger. *Mercantilsystem*; Fr. *système mercantile*; Ital. *sistema mercantile.* A group of theories as to material wealth which prevailed in the 17th and 18th centuries, and under which the BALANCE OF TRADE (q. v.) was made a criterion of gain or loss in such wealth.

The best known writers of this school are perhaps Mun (1664), Petty, and Stewart. The most successful practical exponent was the French financier Colbert.

The mercantile theory has the merit of being the first system of political economy developed. Its fundamental error lies in mistaking a balance of sales and purchases for the real criterion of increase of wealth. An individual or a nation which tries to buy as little as possible is pursuing a miserly policy. The gold may be worth less than the things the

gold will buy. Not diminution of purchases, but increase of investments is the true criterion of excess of production over consumption.

Literature: SMITH, Wealth of Nations, Bk. IV; COSSA, Introd. to the Study of Polit. Econ. (A.T.H.)

Mercy [Lat. *merces*, reward]: Ger. *Gnade*; Fr. *grâce*; Ital. *pietà, misericordia*. The trait of character which tends to mitigate the penalties which may be exacted for offences against law. Cf. PITY. (W.R.S.)

In theology: that attribute of the divine nature by virtue of which guilt is overlooked and a being who deserves punishment is treated with grace and kindness.

Mercy stands contrasted with justice in respect to merit and demerit. It is to be distinguished from love, which has no direct reference to desert. Mercy must also be distinguished from compassion (*misericordia*), which has direct reference to suffering rather than to ill desert. In the Christian scheme of redemption, mercy and justice are reconciled by the atonement of Christ, which cancels the claim of justice and gives free scope to the forgiving function of mercy.

Literature: see ATTRIBUTES (of God). (A.T.O.)

Merit [Lat. *meritus*, deserved]: Ger. *Verdienst*; Fr. *mérite*; Ital. *merito*. The degree in which an agent is worthy of approbation or reward in respect of his conduct. It is contrasted with demerit, which implies not only absence of merit, but liability to disapprobation or to punishment. See also GUILT.

The conception of merit is one of considerable difficulty in ethics—largely from the intermixture of theological conceptions. From the purely moral point of view it is commonly held that merit belongs to the performer of all good or virtuous actions. Thus Butler says, 'Our sense or discernment of actions as morally good or evil implies in it a sense or discernment of them as of good or ill desert' (*Diss. on Virtue*). Sometimes merit is only ascribed when the good action is performed in spite of a temptation to evil; and the degree of merit is then said to vary with the strength of temptation overcome. Thus there is a tendency to restrict the application of the conception of merit to cases in which the motive is unselfish or even self-sacrificing. The tendency both of Calvinistic theologians and of many rationalistic moralists is to refuse to admit that merit can belong to human actions: a man can never do more than his duty. This is the position of the Stoics and of Kant.

The conception is more easily applied (though not more easily justified) when some external ground for deciding upon it is adopted. Thus the Utilitarian ethics regards meritorious actions as socially useful actions whose omission would not be punished, while their performance is rewarded by preferment or by good repute—just as duties are held to be socially useful actions, the omission of which would be punished. (W.R.S.)

The distinctive characteristic of 'merit' is primarily claim to reward (or compensation for effort) as attaching to the conduct of a human being (or something else personified). But, as ethical ideas and sentiments grow more refined, it is recognized that for the highest merit the only appropriate reward is just the recognition of quality of goodness in the 'meritorious' conduct, together with emotional concomitants of such recognition—love and admiration, and their expression in praise and gratitude. In this way, the notion of reward falling into the background, 'merit' comes to be hardly distinguishable from 'worth'—which again is not distinguished from 'goodness' viewed especially as a quality admitting of degrees. See WORTH. (H.S.)

Merit (in theology). The surplus which may remain to the credit of any one in the sight of God after the strict claims of justice and obligation have been satisfied; a conception distinctive of, but not peculiar to, Christian theology.

Merit may be either of Christ or of the saints. The merit of Christ is that credit with God which he acquires through his voluntary obedience to the law which man has broken. This merit constitutes a store of righteousness which may be imputed to the repentant and believing sinner for his justification. There is a radical difference of opinion regarding the question of the merit of the saints, between the Roman Catholic and Reformed Churches, the latter denying the possibility of any merit with God, while the former distinguishes between two kinds of merit, that of congruity and that of condignity; or relative and absolute merit. Only Christ himself can acquire absolute merit. But a man may by the grace of the Holy Spirit go beyond the strict measure of duty, and may acquire relative merit with God, which may under prescribed conditions be transferred to the credit of others. See SUPEREROGATION. (A.T.O.)

Mesenchyma [Gr. μέσος, middle, + ἔγχυμα, infusion]: Ger. *Mesenchyma*; Fr. *mésenchyme*; Ital. *mesenchima*. The non-epithelial portion

of the mesoderm. In vertebrates the mesenchyma assumes at first the character of embryonic connective tissue, i. e. the scattered undifferentiated cells lie in a homogeneous matrix. During the further development of the embryo the mesenchyma becomes differentiated into a great variety of tissues: connective tissue proper, cartilage, bone, smooth muscle fibres, lymph-glands, spleen, &c.

The term was introduced by the brothers R. and O. Hertwig (see O. Hertwig, *Entwickelungsgesch.*, 1st and 6th ed.). (C.S.M.)

Mesmer, Franz (or **Friedrich**) **Anton.** (1734–1815.) Educated at Dillingen, Ingolstadt, and (in medicine) Vienna. Began magnetic or 'mesmeric' treatment in 1772; moved to Paris (1778), where he was eminently successful. Practised in London with less success. A royal committee of eminent French scientists pronounced unfavourably as to his methods in Paris. Gave the name mesmerism to the phenomena now designated hypnotism.

Mesmerism: see MESMER, HYPNOSIS, and HYPNOTISM.

Meso- (in compounds) [Gr. *μέσος*, middle]: Ger. *Mittel-*; Fr. *méso-*; Ital. *meso-*. Of medium size or position between extremes; as mesocephalic, having a head of medium length. Cf. INDEX (cephalic). (J.J.)

Mesoblast [Gr. *μέσος*, middle, + *βλαστός*, germ]: Ger. *Mesoderm, mittleres Keimblatt*; Fr. *mésoblaste, feuillet moyen*; Ital. *mesoblasto* (or *mesoderma*). This term, which is practically synonymous with mesoderm, was introduced by F. M. Balfour, and is used chiefly in England. See EMBRYO, and MESODERM. It has been used with other special meanings by German writers. O. Hertwig employs it as a synonym of mesothelium; others have applied it to the parent cells of the mesoderm. These latter usages have never become current.

Literature: FOSTER and BALFOUR, Introd. to Embryol. (1st ed.); F. M. BALFOUR, Compar. Embryol. (1881). See also MESODERM. (C.S.M.)

Mesoderm [Gr. *μέσος*, middle, + *δέρμα*, skin]: Ger. *Mesoderm, mittleres Keimblatt*; Fr. *mésoderme, feuillet moyen*; Ital. *mesoderma* (or *foglietto mediano*). The middle germ-layer, or that germ-layer from which are derived those tissues which are not developed from the ectoderm on the outside or the endoderm on the inside.

It develops later than the ectoderm and endoderm, and may arise from either or both of these primary layers. It very early differentiates itself into two primary tissues—MESENCHYMA, and MESOTHELIUM (q. v.).

The middle germ-layer was first clearly recognized by von Baer (1829), who called the outer sheet Fleischschicht, the inner sheet Gefässschicht. Remak gave the final demonstration that these two sheets are parts of a single germ-layer.

Literature: C. E. VON BAER, Entwickelungsgesch.; REMAK, Untersuchungen über die Entwickelung d. Wirbelthiere (1850–5); MINOT, Human Embryol., 166; and the literature of EMBRYOLOGY (q. v.). (C.S.M.–E.S.G.)

Mesognathous (Skull): see PROGNATHISM.

Mesothelium [Gr. *μέσος*, middle, + *θηλή*, a nipple]: Ger. *Mesothel*; Fr. *mésothélium*; Ital. *mesotelio*. Applied by Minot to the epithelium lining the primitive body-cavity of the embryo. It includes all the non-mesenchymal portions of the MESODERM (q. v.). During the embryonic period the mesothelium is differentiated into the permanent lining of the body-cavity, into the so-called segments from which the striated muscles arise, and into the rudiments (Anlagen) of the urogenital system.

The word is indefensible etymologically, but is a convenient addition to the terms derived from *θηλή*. Epithelium was first introduced as a name for the layer covering the nipple, and its application was soon extended to all layers conforming to the same type of histological structure, and in this wide sense epithelium is now universally used. Endothelium was introduced by His for epithelia lining all internal cavities, and similarly mesothelium was introduced by Minot for the epithelium lining the body cavity and derived from the middle germ-layer. These epithelia constitute morphologically a distinct group of tissues. (C.S.M.)

Messiah [Heb. *Mashiah*, from *mashah*, to anoint]: Ger. *Messias*; Fr. *Messie*; Ital. *Messia*. The name used in the Hebrew Scriptures to designate the promised Redeemer of the Jewish nation, who was to come in the fullness of time and deliver his people from all their temporal and spiritual enemies. The Messiah is the Christos of the New Testament and was identified with Jesus as the promised Saviour.

The Messiah was the child of promise and covenant engagement. Of the seed of Abraham and the stock of David, he was to unite in his person the threefold offices of prophet, priest, and king, and was to reign over an actual theocracy. The idea of the Messiah

has a marked development in the Old Testament. At first he is to be merely a temporal deliverer, but in the later prophets he has assumed more than human proportions, and is represented as the spiritual redeemer of his people. Jesus Christ as the Messiah stands as the spiritual regenerator and Saviour of humanity. (A.T.O.)

Messianic Hope: Ger. *Hoffnung auf den Messias*; Fr. *espérance messianique*; Ital. *aspettazione messianica*. The expectation of the Jewish people, nourished by covenant promise and prophecy, of a golden age of material and spiritual prosperity under the personal reign of a MESSIAH (q. v.), who should unite in himself the offices of prophet, priest, and king.

The Messianic hope was the inspiring motive of Old Testament prophecy and the persistent ideal which gave unity to Jewish history. It was the kindler of an inextinguishable aspiration which has been able to survive even the rejection of Christ and is entertained by at least a portion of the Jewish people at the present day. What is called Reformed Judaism has dropped the Messianic feature from its creed.

Literature: BRIGGS, Messianic Prophecy; ORELLI, Old Testament Prophecy; DELITZSCH, Messianic Prophecy, &c.; DRUMMOND, The Jewish Messiah (1877); A. EDERSHEIM, Prophecy and Hist. in relation to Messiah (1885). (A.T.O.)

Metabolism [Gr. *μεταβολή*, a change]: Ger. *Metabolismus, Stoffwechsel*; Fr. *métabolisme, échanges nutritifs*; Ital. *metabolismo*. The sum of the changes, constructive and destructive, which go on in living bodies.

Food material, on the one side, is built up to form living protoplasm of muscle, gland, nerve, or other tissue. This constructive phase of metabolism is termed ANABOLISM (q. v.) or ASSIMILATION (q. v.). On the other hand, living protoplasm, in the process of breaking down into simpler, dead compounds, yields the energy by which the organism does its work, these processes being grouped under the term KATABOLISM (q. v.). 'Assimilation and disassimilation, or anabolism and katabolism, go hand in hand, and together constitute an ever-recurring cycle of activity, which persists as long as the material retains its living structure, and which as a whole is designated under the name metabolism' (Howell's *Textbook*, as below).

Metabolism of plants, aided by the energy of sunlight, is chiefly anabolic, constructing inorganic substances into living protoplasm, or into proteids, carbohydrates, and fats. Animal protoplasm, on the other hand, is chiefly katabolic, turning these food materials to simpler compounds, principally to water, carbonic acid, and urea.

Literature: the textbooks of physiology, especially HOWELL, Amer. Textbook of Physiol. (C.F.H.)

Metagenesis [Gr. *μετά* + *γένεσις*, production]: Ger. *Metagenese*; Fr. *métagenèse*; Ital. *metagenesi*. A form of ALTERNATION OF GENERATIONS (q. v.) among invertebrates, chiefly among coelenterates and vermes. The term was introduced by Owen to mark the distinction from metamorphosis.

The essential facts of this phenomenon are the production of a first generation of individuals by the ordinary sexual processes, and the production of a second generation by asexual processes. Individuals of the second generation propagate sexually, but their offspring belong to types of the first generation. The relations are often further complicated: first, through the unlikeness of two generations in structure; second, through the increase in the number of asexual generations. For example: many jelly-fish deposit eggs, which develop into hydroid individuals, and these multiply by transverse division and produce medusoid individuals, like the original parent; tape-worms lay eggs, which produce the so-called larval young, and these multiply asexually (as in Coenurus), producing a second generation of sexually active tape-worms.

Literature: KORSCHELT and HEIDER, Entwickelungsgesch. d. Wirbellosen; PARKER and HASWELL, Zoology, i. See also under ALTERNATION OF GENERATIONS. (C.S.M.)

Metakinesis: see KINESIS, and MIND-DUST THEORY.

Metamere [Gr. *μετά* + *μέρος*, a part]: Ger. *Metamer*; Fr. *métamère*; Ital. *metamero*. A SEGMENT (q. v.) of the body. (C.S.M.)

Metamorphopsia [Gr. *μεταμόρφωσις*, change, + *ὤψ*, eye]: Ger. *Metamorphopsie*; Fr. *métamorphopsie*; Ital. *metamorfopsia* (suggested—E.M.). If a piece of the retina, through a wound or through some pathological condition, is detached from its normal situation and still retains its sensibility to light, the space-quale (surface-quale) of the light-sense will also be retained. The detached portion may have grown on again in a different place, or, since it is nourished chiefly from in front, it may continue to function for some time in spite of being detached (*solutio retinae*, detachment

of the retina), although it is no longer in correct correspondence with the outer world nor with the space-reports of the other eye. Such errors of local sense are called metamorphopsiae. They occur also in the cutaneous local sense, if a piece of translocated skin retains its vitality—as it may do when it is not entirely cut off, but rotated about a narrow non-detached portion as a stem. Both in the case of the skin and in that of the retina, a correct local sense is gradually recovered. This has been taken as showing that the spatial attribute of the visual sense is not direct, but indirect; if we saw yellow where we should see green, we could not educate ourselves into thinking that the sensation was green; it is only in the case of a sensation entering consciousness merely as a sign for another sensation that re-education is possible. More recent observations show, however, that in the case of the skin there is no retention of space-sense unless the connecting stem of skin is retained; hence the old space-sense may be preserved by means of nerve-fibres which pass through this stem, and the new may be regained only after the new nervous connections have grown up. But this view would not seem to take account of the retinal cases, for there the nervous connections grow out from the front, and have not been, at least in cases of *solutio retinae*, broken off at all, and hence the recovery (not the error) would here be difficult to account for, except when it can be supposed that the retina has returned to exactly its original position. The subject is in much need of careful revision, as it has been made a crucial feature in theories of the space-sense. Wundt himself has experienced the distortion in one of his eyes.

Literature: Wundt, Physiol. Psychol. (4th ed.), ii. 102; Leber, in Graefe u. Saemisch, Handb. d. Augenh., v (2), 612, 619, and literature there given; Stransky, Biol. Centralbl. (1900). (C.L.F.)

Metamorphosis [Gr. *μετά*, change, + *μορφή*, form]: Ger. *Metamorphose*; Fr. *métamorphose*; Ital. *metamorfosi*. A considerable change of form, sufficient to affect its general appearance and characteristics, occurring more or less abruptly during the development of an individual.

The change of a Larva (q. v.) into a Chrysalis (q. v.), or of a chrysalis into an Imago (q. v.), is a metamorphosis. The term is not applied to a gradual transformation, as of the embryo into an adult. (C.S.M.)

Literature: Sedgwick, Zoology; Packard, Entomology; Comstock, Entomology; Lubbock, Origin and Metamorphoses of Insects (1874); F. M. Balfour, Compar. Embryol. (1881); D. Sharp, art. Insecta, in Camb. Nat. Hist. (C.S.M.–E.S.G.)

Metaphysics [Gr. *μετά* + *φυσικά*, things physical or natural]: Ger. *Metaphysik*; Fr. *métaphysique*; Ital. *metafisica*. Owes its name to the editorial arrangement of Aristotle's treatise on the subject by Andronicus of Rhodes (cir. 63 B. C.), who placed it after the treatise on physics, with the general superscription *τὰ μετὰ τὰ φυσικά*. Aristotle's own name for the discussions contained in it was 'First Philosophy' or 'Theology,' and from his description of them as concerned with the nature of 'being as being,' the later term Ontology (q.v.) was coined. The name Metaphysica first appears—as a singular noun—in Averroes and the scholastics of the 13th century.

The term has proved an unfortunate one, as suggesting that the science is divorced from experience and concerned altogether with the transcendent. Kant is responsible for spreading this idea of metaphysics by his repeated descriptions of it as a science of assertions about the transcendent, a science, moreover, involved in a series of inevitable self-contradictions. He certainly had historical ground for his strictures upon the old metaphysic, if we take Wolff's definition of it as 'the science of all that is possible, so far as it is possible' —a science supposed to be evolved by analysis from the logical principle of identity or contradiction. Metaphysics was divided by Wolff into a general part (ontology), which treats of the most abstract determinations of being in general, whether corporeal or spiritual, and three special parts (rational cosmology, rational psychology, and rational theology), named according to their principal subjects (the world, the soul, and God). These latter disciplines form the subject of Kant's attack in the *Dialectic*, and in contrast with the Wolffian metaphysics he gives his own idea of the science of metaphysics, as the only science which admits of completion: 'This science is nothing more than the inventory of all that is given us by pure reason, systematically arranged.' To this science the *Critique*, as the doctrine of the limits of pure reason, was designed to form an introduction. According to this Kantian usage, metaphysics would become synonymous with Epistemology (q. v.) or with a part of that science.

Wolff's system represents, however, neither the best modern nor the old Aristotelian con-

ception of philosophy. Metaphysics, as the central philosophical discipline, might rather be defined as simply the systematic interpretation of experience and the explication of all its implicates. The implicates of experience cannot be described — in any condemnatory sense at least—as 'beyond' experience; although, doubtless, the result of metaphysical analysis may be to show the impossibility of identifying experience with the isolated particulars of sensationalistic philosophy. If experience be taken without any such arbitrary limitation of its meaning, metaphysics seeks simply to harmonize or rationalize experience, i. e. to exhibit it as a system or interconnected whole. Metaphysics, as William James pithily puts it, 'means only an unusually obstinate attempt to think clearly and consistently' (*Textbook of Psychol.*, 461); or, as Plato expressed it, it is the effort to think things together—not in isolation and abstraction, but in relation to one another, and as parts or aspects of one concrete whole. The different sciences are all 'abstract,' because each starts with certain presuppositions or working postulates which give true results within the limits of the science itself, but which are found on critical examination to be full of obscurity and contradiction, if offered as true in the full sense of that term, namely, as giving a finally intelligible explanation of the experience in question. Metaphysics aims at correcting the abstractions of the different sciences, and relating them to one another, reaching thereby an expression of the concrete truth of experience as such. The truth, however, which metaphysics seeks to reach—even when presented under the questionable designation of absolute truth—does not really transcend experience in any other sense than that in which the whole transcends its parts.

Metaphysics, in this sense, must obviously coincide to a large extent with epistemology, conceived as 'criticism of categories,' or with logic in the Hegelian sense; and accordingly the most convenient usage (and that most in harmony with the history of the term) is probably to regard metaphysics—the theory of knowing and being—as the wider term, including as its two subdivisions or aspects epistemology and ontology. The latter term would then be used to signify what is the culmination of metaphysical effort, a synthetic statement in ultimate terms of the nature of the real, so far as that is attainable from the human standpoint. But the disuse of the term ontology in current philosophical writing has led to a considerable variety of usage in regard to the term metaphysics, which is still further increased, of course, by the divergences of philosophical creed in the writers. Many writers of positivistic and Neo-Kantian tendencies, attaching to metaphysics the old associations of transcendency, deny the possibility of the science, and put epistemology, or analysis of conceptions, in its place. Others, on the contrary, Hegelian in general tendency, associate epistemology solely with subjectivistic attempts, of a Kantian or sceptical kind, to pronounce on the validity of thought as such, and deny in consequence the possibility of such a science; but they would apparently apply the term metaphysics to an analysis of conceptions much resembling what the former set of writers include under the head of epistemology. Among recent English writers, it may be noted that both Shadworth Hodgson and Laurie use metaphysics very nearly as equivalent to epistemology, but the former finds it necessary to supplement this investigation by what he calls 'the constructive branch of philosophy' (cf. *Philos. of Reflection*, chap. xi), while the latter indicates a distinction between this 'analytic,' or metaphysic considered as a demonstrative science, and what he calls 'speculation' or 'a synthetic cosmic construction on the basis of the preceding analytic' (cf. *Met. Nova et Vetusta*, 284, 2nd ed.). Perhaps the commonest usage at the present day, and one that has much in its favour, is to use metaphysics in a narrower sense as opposed to epistemology, in which case it corresponds with the definition of ontology given above. In this sense it is used, for example, by Paulsen, Külpe, and Volkelt, the most recent authors of Introductions to Philosophy. Külpe points out that if the analysis of knowledge and its conceptions be excluded from its sphere, there still remains as the task of metaphysics proper 'the development of a Weltanschauung.' In essaying this task, he proceeds, metaphysics is based upon practical motives on the one hand, and, on the other, upon the demand for a completion of scientific knowledge which shall be free from contradictions. In a sense, any such view of the world as a whole may be said to transcend the fragmentary data at our disposal. Within the domain of the sciences, which start from certain hypotheses, demonstration and verification of particular propositions may be possible, on the assumption of these hypotheses; but metaphysics, in rising

to its supreme hypotheses or postulates, can obviously never hope to offer demonstration or verification in the same sense. It is one thing, as Volkelt puts it, 'to postulate supreme principles of a certain nature, that is, starting from the facts of experience to declare that the solution of certain problems can lie only in the direction of certain fundamental thoughts; it is something quite different to exhibit everything individual as arising, so to speak, out of the highest principles, and explainable from the inner necessity of these principles.' In very similar words, at the conclusion of his *Metaphysics*, Lotze expresses his profound conviction of 'the living and active meaning of the world,' but adds: 'We do not know this meaning in its fullness, and therefore we cannot deduce from it what we can only attempt, in one universal conviction, to retrace to it.' This is, indeed, the main difference between the pretentious metaphysics of the Wolffian type and the more modest attitude of present-day thinkers. (A.S.P.P.)

If the last-mentioned usage be adopted—which seems advisable—we have the term PHILOSOPHY (q.v.) to include both epistemology and ontology (metaphysics).

Literature: that of philosophy generally, see BIBLIOG. B, 1, *c*; also for special periods and authors, BIBLIOG. A, 1, 2; see also the Histories of Philosophy, and the Introductions to Philosophy (BIBLIOG. A, 1, and B, 1 *a*). For contemporary works see the annual lists issued by the Arch. f. system. Philos., 1 ff. Other bibliographies are listed in the vol. (iii) of bibliographies, GENERAL, 1. (J.M.B.)

Metapsychosis: see TELEPATHY.

Metayer System [Med. Lat. *medietarius*]: Ger. *Halbpachtsystem, Metawirthschaft*; Fr. *métayage*; Ital. *mezzadria*. Farming on share rent; especially in those countries where the class of mediarii has had a continuous existence. The share is not necessarily one-half; in Tuscany, as a rule, the metayer receives two-thirds.

In England the commutation of the feudal labour dues was made into a small fixed money payment, which put the occupier almost into the position of an owner. In the Romance countries the change was not so complete; and in Italy, specifically, the nobles were powerful enough to insist on the receipt of shares of the produce, which left the cultivator far short of a position of independence. (A.T.H.)

Metazoon [Gr. μετά + ζῷον, an animal]: Ger. *Metazoon*; Fr. *métazoaire*; Ital. *metazoo, metazoario*. An animal consisting of several or many cells differentiated into tissues, as opposed to a protozoon, which consists of a single cell.

The term was introduced by Haeckel in his *Generelle Morphologie*, 1867. It includes all animals excepting the Protozoa. (C.S.M.)

Metempirical [Gr. μετά + ἐμπειρία, experience]: Ger. *metempirisch*; Fr. *métempirique*; Ital. *metempirico*. A term due to George Henry Lewes, and used by him in a sense almost exactly equivalent to the Kantian use of transcendent—that which is not verifiable within the bounds of possible experience.

'Since we are to rise to metaphysics through science, we must never forsake the method of science; and further, if in conformity with inductive principles we are never to invoke aid from any source higher than experience, we must, perforce, discard all inquiries whatever which transcend the ascertained or ascertainable data of experience. Hence the necessity for a new word which will clearly designate this discarded remainder—a word which must characterize the nature of the inquiries rejected. If, then, the *empirical* designates the province we include within the range of science, the province we exclude may fitly be styled the *metempirical*' (Lewes, *Problems of Life and Mind*, 1st series, 16). In Barratt's *Physical Metempiric* the term is used in a wider sense, which makes it include whatever cannot literally become part of the subjective experience or consciousness of any given person. In this sense it is made to include the existence of other conscious persons who are, in Clifford's phrase, 'ejects' or mental constructs to explain certain features of subjective experience, not themselves parts of that experience as a psychical process. But the current sense of the term is that attached to it by its inventor. (A.S.P.P.)

Metempsychosis [Gr. μετά + ἐμψυχοῦν, to animate]: Ger. *Metempsychose, Seelenwanderung*; Fr. *métempsycose*; Ital. *metempsicosi, transmigrazione*. The transmigration of the soul from one bodily form, human or animal, into another.

This is one of the earliest forms in which the doctrine of the immortality and pre-existence of the soul appears, and is probably connected with the primitive theory of a kinship or blood-relationship between man and beasts (cf. Burnet, *Early Greek Philos.*, 100). Herodotus (ii. 123) derives the belief from Egypt: 'The Egyptians are the first who propounded the theory that the human soul is immortal, and that when the body of any one perishes, it enters into some other

creature that may be born ready to receive it, and that when it has gone the round of all created forms in land, in water, and in air, it once more re-enters a human body born for it; and this cycle of existence takes place in 3,000 years.' Metempsychosis is one of the best-authenticated parts of the teaching of Pythagoras, with whose name it has continued to be specially associated. Plato does not exactly teach the doctrine dogmatically, but avails himself of it in the mythical presentations of his thought. By him it is connected with a law of moral retribution. The details vary, and it is difficult to say how far any of them are taken seriously by Plato (cf. *Phaedrus*, 249; *Republic*, x. 614 f.). In the myths of the *Gorgias* and the *Phaedo* the doctrine does not appear. (A.S.P.P.)

Besides its prominence in Orphic, Pythagorean, and Egyptian teaching, metempsychosis is a tenet of Indian, Jewish (Cabbala), and Swedenborgian philosophy. It is interesting to note a tendency in current discussion of the immortality of the soul to recur to the hypothesis of pre-existence, as following from the arguments which are urged in support of post-mortem personal existence. The poetry of Plato's doctrine of 'reminiscence' (*ἀνάμνησις*) reappears also, as in Wordsworth's *Intimations of Immortality*. Yet it is difficult to call that a future life in any vital sense which is thought of as being disconnected with this life, as this is with a possible earlier life.

Literature: see IMMORTALITY, and ORIENTAL PHILOSOPHY. (J.M.B.)

-meter (apparatus ending in): see LABORATORY AND APPARATUS, III, E.

Method [Lat. *methodus*; Gr. *μέθοδος*, from *μετά* + *ὁδός*, way]: Ger. *Methode*; Fr. *méthode*; Ital. *metodo*. See the topics immediately following; also PSYCHOPHYSICAL METHODS, and SCIENTIFIC METHOD.

Method and **Methodology**, or **Methodeutic**: Ger. *Methodenlehre*; Fr. *méthodologie, théorie de la méthode*; Ital. *teoria dei metodi, metodologia*. A branch of logic which teaches the general principles which ought to guide an inquiry.

Owing to general causes, logic always must be far behind the practice of leading minds. Moreover, for the last three centuries thought has been conducted in laboratories, in the field, or otherwise in the face of the facts, while chairs of logic have been filled by men who breathe the atmosphere of the seminary. The consequence is that we can appeal to few works as showing what methodology ought to be. The first book of Bacon's *Novum Organum* is well enough, as far as it goes, and was no doubt useful in its day. Senebier's *L'Art d'observer* is instructive. Comte's *Philosophie positive* accomplished something. Whewell's *History of the Inductive Sciences* and other works have the advantage of being written by a man of great power of investigation, himself, who drew his doctrine from the facts of scientific history. Mill's *System of Logic* is, no doubt, of considerable value, although the author knew too little of science. There is hardly one of the illustrations of fine method adduced in his first edition which has not been refuted. Beneke's *Logik in praktischer Absicht* was not altogether without value. Of great value, also, is Jevons' *Principles of Science*. Pearson's *Grammar of Science* is a work of great force, but unfortunately too much influenced by certain philosophical ideas. Wundt devotes two of the three volumes of his *Logik* to Methodenlehre.

The traditional doctrine of method is confined chiefly to rules of definition and division, which teach an exactness of thought much needed, but are marked by the total absence of modern ideas. Cf. SCIENTIFIC METHOD, and EVIDENCE. (C.S.P.)

Method (in education). An orderly procedure in teaching; a systematic way of teaching and training.

Methods of teaching depend, in a last analysis, upon the acts of mind involved in sense experience and thought. First impressions are prone to inadequacy and even incorrectness. They must be reinforced by drafts upon the stored-up experience of the mind—anticipations of what we may look for in the complete identification of the object. After objects are fully identified, we seek to find their universal properties. In thus making the complete survey of an object of knowledge three steps are involved: (*a*) preliminary apperception or identification; (*b*) reinforcement of present by past experience; (*c*) advance to generalization. In acquisition, therefore, three things are involved: namely, apperceptive identification, deductions of anticipations for further identification, generalization by inductive processes. These are the essential steps of an adequate method. They may be recognized in the terms observation, deduction, induction. When the emphasis is laid on the first, we have the so-called method of observation; when on the second, that of deduction; when on the third, that of induction.

The variety and combination possible in

these fundamental stages of method are numerous. Thus, if we arrive at generalizations through catechetical means, we speak of the Socratic method. The Herbartians emphasize (1) the apperception of observed facts, (2) the inductive approach to generalization, (3) the deductive application of these generalizations to appropriate new particulars. From the standpoint of the teacher, we have the lecture method (the monologue); the developing, catechetical or Socratic method (the dialogue). With regard to the thing learned, we may begin with the whole and proceed to the parts (analytical method), or we may begin with the parts and proceed to the whole (synthetical method). In either of these cases the three fundamental stages (observation, deduction, and induction) are to be traced. With regard to the learner, knowledge must be acquired in accordance with the fundamental forms of thought, which are (1) the conception, (2) the judgment, (3) the syllogism.

Most Herbartian writers name what they conceive to be five essential stages or steps in a correct method, as follows:—

(1) *Preparation.* This consists of a brief preliminary review of such acquired knowledge or experience as will best fit the child's mind for a rapid and interested appropriation of the new matter about to be presented. (2) *Presentation* of the new lesson. (3) *Association.* This stage provides for more complete apperception of the facts of the new lesson, by associating them intimately with related facts already acquired. (4) *Generalization.* This stage gathers up the facts of the lesson in such a manner that their deeper inner significance may be grasped by the pupil. In many studies these generalizations appear in the form of definitions, rules, principles, laws, maxims, &c. (5) *Application.* By this stage is meant those drill and practical exercises which tend to fix knowledge in mind, and to secure a facile application of it to practical affairs. As may easily be seen, these stages are but an amplification of observation, deduction, and induction, the three logical steps found in all experience and thinking.

Literature: Bain, Educ. as a Sci., 230–357; Rosenkranz, Philos. of Educ., 90–105; Herbart, Sci. of Educ. (trans. by Filkin), 154–86; Tompkins, Philos. of Teaching, 73–275; McMurry, The Method of the Recitation; De Garmo, Essentials of Method. (C.DeG.)

Methods of Ethics: Ger. *Methoden der Ethik*; Fr. *méthodes de morale*; Ital. *metodi dell' etica.* The rational modes of procedure for determining what is morally right or reasonable and what the reverse.

In his *Methods of Ethics* (1874) H. Sidgwick distinguishes the different methods which seem prima facie reasonable, and then develops and applies each so as to bring out the system of moral judgments to which it leads. He defines a 'method of ethics' as 'any rational procedure by which we determine right conduct or practice in any particular case.' The expression was given currency by him. (W.R.S.)

Methodeutic: see Method and Methodology.

Methodical Selection. A term used by Darwin for a form of Artificial Selection (q. v.). (J.M.B.)

Methodology: see Method and Methodology.

Method-whole: Ger. *methodische Einheit*; Fr. (not in use); Ital. *unità metodica* (suggested—E.M.) A portion of the subject-matter of instruction to which the formal steps or stages of instruction conveniently apply.

Herbartian writers on method advocate the subdivision of the subject-matter of instruction into minor wholes or unities, so that with each group there may be (1) the acquisition of new facts, (2) an inductive organization of these facts into general truths, and (3) a deductive application of the generalizations to new sets of allied facts. The aim of each group is the leading purpose for which it is taught; the stages in the treatment of the method-whole are the 'formal steps' of instruction. See Method (in education), and Formal Steps.

Literature: Ziller, Allg. Päd., 294; De Garmo, Essentials of Method, chap. vi; McMurry, The Method of the Recitation, chap. xii. (C.DeG.)

Metronymic (or **Mat-**) [Gr. *μήτηρ*, mother, + *ὄνομα*, name]: Ger. *metronymisch*; Fr. *métronymique*; Ital. *matronimico.* (1) Noun. A name derived from the name or description of the mother or other female ancestor. (2) Adj. Applied to the female line of descent, marked by the perpetuation of mother names to the exclusion of father names. (3) Adj. Tracing descent through mothers, e. g. a metronymic clan.

(1) Used by Freeman (*Norman Conquest*, v. 380) to characterize certain personal names surviving in England before and after the Norman Conquest. (2) Used by Réclus (*Primitive Folk*, 157) of the early customs of Egypt. (3) Used in systematic sociology by

Giddings (*Princ. of Sociol.*), instead of the term matriarchal. (F.H.G.)

Meyer's Experiment: Ger. *Meyer'scher Versuch*; Fr. *expérience de Meyer*; Ital. *esperienza del Meyer*. An experiment in visual contrast. Lay on a coloured field a small piece of grey paper, and cover the whole with white tissue-paper. The colour complementary to the field spreads over the grey. The vividness of the effect is due not to the diminution of saturation but to the blurring of the outline of the grey. Cf. CONTRAST (visual, simultaneous).

Literature: H. MEYER, Pogg. Ann. (1855), xiv. 170; HELMHOLTZ, Physiol. Optik (2nd ed.), 547; EBBINGHAUS, Psychologie, 221; SANFORD, Course in Exper. Psychol., expt. 152 *c*. (E.B.T.)

Meynert, Theodor. (1833–92.) Educated at Vienna. Privatdocent in brain anatomy, 1865; prosector of the Vienna Insane Asylum, 1866; director of the Psychiatric Clinic, and assistant professor of psychiatry in the University, 1870; professor of neurology, 1873; privy councillor, 1885. President of the Psychiatric Association, vice-president of the Vienna Medical Society, and member of the Imperial Academy of Sciences.

Michelet, Karl Ludwig. (1801–93.) Studied law and, later, philosophy at Berlin; assistant professor of philosophy there, 1829. He is sometimes classed as one of the 'older' Hegelians, one of the right wing.

Microcephalic [Gr. *μικρός*, small, + *κεφαλή*, head]: Ger. *mikrocephal*; Fr. *microcéphale*; Ital. *microcefalo*. Having an abnormally small head, or one below a certain standard; in the adult less than 431 mm. or 17 inches in circumference, or 1,350 c.c. capacity of the cranium.

The deficiency mainly affects the brain, and is proportionally most marked in the hemispheres. Microcephalic persons are almost always of defective intelligence, and are frequently idiots of extreme types. Only a small percentage of idiots, however, are microcephalic. The causes of this condition are obscure; the frequency with which the sutures of microcephalic skulls are found closed is significant. Extreme cases of microcephaly have attracted attention from ancient times to the present. Cf. IDIOCY. (J.J.)

Literature: W. W. IRELAND, Idiocy (with literature); VOGT, Les Microcéphales ou Hommes-singes (1867); GIACOMINI, Cervelli dei Microcefali (1890). (J.J.–E.M.)

Microcosm: see MACROCOSM.

Micro-organism [Gr. *μικρός*, small, + *ὄργανον*, an instrument]: Ger. *Mikroorganismus*; Fr. *micro-organisme*; Ital. *microrganismo*. An organism too small to be visible to the naked eye. Chiefly applied to the lowest fungi, but occasionally to some of the Protozoa. Cf. UNICELLULAR ORGANISMS. (C.S.M.)

Mid- [AS. *midde*]. The median. See MEAN AND MEDIAN.

Used, in various compounds, in the terminology introduced by F. Galton (*Natural Inheritance*) for the mathematical treatment of problems of heredity. Mid-stature: 'the median [stature] of the general population' (ibid. 92). Mid-parent: 'an ideal [supposed] person of composite sex whose stature [e.g.] is halfway between the stature of the father and the transmuted stature of the mother' (ibid. 87; transmuted meaning increased by the amount requisite to make female comparable with male stature, ibid. 56). Mid-error: probable error (ibid. 58); cf. ERRORS OF OBSERVATION. (J.M.B.)

Mid-parent: see MID-.

Middle Term (and **Middle**) [trans. of *terminus medius, medium*, used by Boethius to translate Aristotle's *ὁ μέσος ὅρος, τὸ μέσον*]: Ger. *Mittelbegriff*; Fr. *terme moyen*; Ital. *mezzo termine, termine medio*. The adjective *μέσος* is applied in Greek to a third object additional to two others, when the idea of intervening can hardly be detected. It is, therefore, perhaps needless to seek further for Aristotle's intention in calling that term, by the consideration of which two others are illatively brought into one proposition as its subject and predicate, the middle term, or middle. It is the most important factor of Aristotle's theory of reasoning.

The same word means little more than third in the phrase 'principle of excluded middle,' which is, indeed, often called *principium exclusi tertii*. See LAWS OF THOUGHT. On the other hand, something which partakes of each of two disparate natures, and renders them capable of influencing one another, is called a *tertium quid* (Aristotle's *ἡ τρίτη οὐσία*). (C.S.P., C.L.F.)

Migraine or **Megrim** [Gr. *ἡμικρανία*, half-headed]: Ger. *Migräne*; Fr. *migraine*; Ital. *emicrania*. A severe headache, almost invariably confined to one side of the head (hence also termed hemicrania), and accompanied by the symptoms described below. The tendency to migraine, which is popularly known as 'sick-headache,' is often inherited.

It is most apt to appear in youth, and ordi-

narily diminishes or disappears towards middle life. In many cases the attack is preceded by a premonitory period, in which disordered sensations occur, such as dizziness, restlessness, or peculiar visual disturbances. See the figures 1–3, drawn from his own symptoms by Baldwin (*Science*, May 4, 1900), who thinks the progress of the stigmate indicates the development of the disturbance in the optical centres or connecting-fibres. The attacks are irregularly periodic, and may be induced by overwork, worry, indigestion, eye-strain, and other causes. The typical symptoms begin with a dull headache, which tends to increase, becomes burning, boring, or piercing, and overpowering in intensity, with continued visual symptoms—such as floating spectres, 'fortification' patterns (as in the figures)—vaso-motor and digestive disturbances, and vomiting. With absolute repose the symptoms, which may last from several hours to several days, gradually subside. Migraine is regarded as a significant symptom in the delineations of nervous instability when it occurs in connection with serious nervous and mental disorders. It is a functional central disturbance, but several views are entertained as to its exact seat.

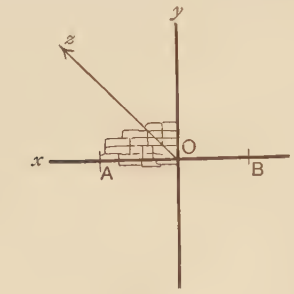


Fig. 1.

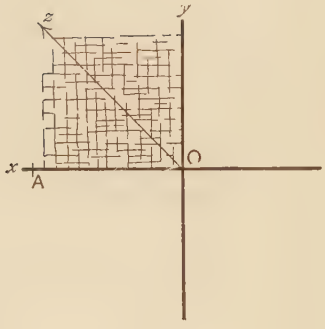


Fig. 2.

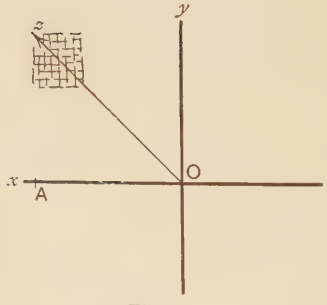


Fig. 3.

Optical symptom in migraine (Figs. 1–3). *O*, point of fixation in centre of left hand held laterally 18 in. before the eyes. *AB*, length of hand. *Oz*, direction of development of symptom (in left upper quadrant). Fig 1. Initial stage, true size (about), only symptom of any sort present. Fig. 2. Maximum stage, accompanied by massive headache and beginning of nausea. Fig. 3. Final stage (before rapid fading); violent more localized headache and nausea. (In Figs. 2 and 3, *AO* equals *AB* of Fig. 1.) Duration of symptom, 1 to 1½ hours. Symptom is invariable for recurrent attacks, and for monocular (either eye) and binocular vision, and has a fluttering wavy movement which cannot be figured.

Literature: Liveing, Megrim, Sick-headache, &c. (1873); for good accounts, with full citation of literature, see Real-Encyc. der gesammten Heilkunde (1897); Moebius, Nothnagel's Spez. Path. u. Ther., xii; Wood's Ref. Handb. of the Med. Sci., sub verbo. (J.J.)

Miletus (school of). Comprises the philosophers of Miletus, Thales, Anaximander, Anaximenes. See these names; and cf. Pre-Socratic Philosophy. (J.M.B.)

Milieu [Fr.]. Environment (q. v., also for equivalents in other languages).

Used as a biological term by Lamarck (*Philos. Zool.*, 1809, ii. 4 ff.), and by Comte (*Syst. de politique positive*, vi. 574) who expanded the meaning by the phrase milieu intellectuel, and applied in sociology by Taine. Cf. Barth, *Philos. d. Gesch. als Sociol.*, i. 33. (J.M.B.–F.H.G.)

Mill, James. (1773–1836.) Born at Logie Pert, Forfarshire, Scotland. Educated at Edinburgh, he was licensed to preach in the Church of Scotland, 1798, but soon abandoned the ministry. Tutor in the family of Sir John Stuart. Moved to London, 1800, and became an author. Held an important position in the office of the East India Company. He is called the founder of English Associationism (q. v.), through his work, *An Analysis of the Phenomena of the Human Mind.*

Mill, John Stuart. (1806–73.) Born in London. Son of James Mill (q. v.), who directed his education. The year 1820 was spent mostly in the south of France. Studied

law with John Austin, a disciple of Bentham. Entered the service of the East India Company in 1823, and remained connected with it until 1856. He was the chief conductor of the *Westminster Review*, 1835–40. Member of Parliament, 1865. His life after 1856 was chiefly directed to literary pursuits. Member of the Académie des Sciences Morales, and noted for his contributions to logic (see INDUCTION) and ETHICS (q. v.); see also UTILITARIANISM. On James and J. S. Mill, a late work is Stephen, *The English Utilitarians*, i, ii.

Millenarianism [Lat. *mille*, thousand, + *annus*, year]: Ger. *Lehre von dem tausendjährigen Reich*; Fr. *doctrine du millénium*; Ital. *dottrina dei millenarii*. The doctrine of the personal reign of Jesus Christ upon earth, under which the powers of evil are to be restrained and the principles of Christianity to become completely and universally prevalent.

The germ of the doctrine is found in the Messianic hope, which prefigured a golden age of temporal as well as spiritual prosperity. The first coming of Christ only partially realized this hope. Hence the expectation, nourished by some of the sayings of Jesus, and especially by the prophecy of John in the Apocalypse, of a second advent at some time in the future, and the re-presentation, under very dramatic circumstances, of a *régime* under which Christianity should completely triumph. The time of its consummation and the period of its continuance is confessedly indefinite.

Literature: A. HARNACK, Encyc. Brit., art. Millennium; SCHÜRER, Lehrb. d. neutestamentlichen Zeit-Gesch. (1881), §§ 28, 29; CARRODI, Krit. Gesch. d. Chiliasmus. (A.T.O.)

Millennium [Lat. *mille*, thousand, + *annus*, year]: Ger. *Millennium*; Fr. *règne millénaire*; Ital. (*il*) *Millennio*. A supposed period either before or after the second coming or advent of Christ, sometimes limited to one thousand years, during which the kingdom of God will be established on earth. Cf. CHILIASM. (J.M.B.)

Mīmānsā Philosophy: see ORIENTAL PHILOSOPHY (India).

Mimetism [Gr. *μίμησις*, imitation]: Ger. (1) *Nachahmung* (imitation), *nachahmend* (mimetic), (2) *Nachäffung*, *Mimik*; Fr. *mimétisme*; Ital. (1) *mimetismo*, (2) *mimesi*. (1) Those forms of (mimetic) RESEMBLANCE (q.v.) and of IMITATION (q.v.) in which that which is resembled (the 'copy') is itself a factor in the production of that which resembles it, and including the imitation of a copy consciously set up as a model. This meaning is recommended as part of the scheme of connotation given in the table under RESEMBLANCE.

(2) A particular case of (1): the mimetic condition of certain patients or of minds of a low order which express themselves largely in pantomime, mimicry, more or less slavish and impulsive copying of what they see and hear. The absence of even this power (in the sense 2) gives the defect called AMIMIA (q. v.).

The term mimetism is recognized in pathology, being already established in French and Italian. Other instances are LALLING (q. v.), plastic IMITATION (q. v.) or social CONTAGION (q. v.), states of consciousness generally which are associated with what is called CIRCULAR (or repeating) REACTION (q. v.), and the 'inner imitation' of aesthetic theory (see Hirn, *Origins of Art*, 98, who has adopted the word Mimetism). Cf. SEMBLANCE.

Another important case falling under the definition (1) is biological MIMICRY (q.v.), understood as including all the various forms of biologically produced mimetic resemblance.

For literature see the topics referred to, especially IMITATION. (J.M.B., G.F.S.)

Mimicry (in biology) [Gr. *μιμικός*]: Ger. (English term); Fr. *mimétisme*; Ital. *mimetismo*, *mimesi*. The term mimicry is generally used to express a resemblance, independent of affinity, between certain species inhabiting the same country—a resemblance which appeals to the senses of other animals, especially to the sense of sight, not uncommonly to hearing, occasionally to smell and touch.

The term is often extended to include the likeness of animals to their environment for the purpose of concealment from enemies or prey (protective and aggressive, or procryptic and anticryptic resemblance). These latter extremely numerous cases of resemblance are more conveniently kept separate, although they have much in common with those included under mimicry. H. W. Bates, who was the first to offer a feasible explanation of mimicry (*Linn. Soc. Trans.*, xxiii, 1868), used the term in its extended sense, but has not been followed by Fritz Müller, Wallace, Trimen, Meldola, Poulton, Dixey, and others who have contributed to the subject. The essential difference between mimicry and protective resemblance will appear below.

Even the definition given in the first paragraph is too wide, and includes at least four distinct kinds of resemblance, to only one of which the term mimicry in its scientific sense is strictly applicable.

(1) Visible resemblances, independent of

affinity, are brought about by similarity of function. The resemblance of form between the greyhound and the racehorse, or between the carnivorous marsupial *Thylacinus* and a true Carnivor, such as the dog, are to be thus explained. A still more striking example is the appearance of a mole-like form as an adaptation to mole-like habits in three distinct orders of mammalia—the Insectivora, Rodentia, and Marsupialia. Such resemblances were called by Darwin 'analogical' or 'adaptive.' Cf. CONVERGENCE (in biology), and ORGANIC SELECTION (2).

In order to fall into line with the terminology suggested for mimicry and its allies, the term *syntechnic*, with the noun *syntechne* (from *σὺν*, together, and *τέχνη*, art, employment, profession), has been formed for the writer by Arthur Sidgwick, to express these results of functions in common.

Careful analysis of the anatomical basis of the resemblances in question will show that they are secondary, being merely an incidental result of the functions which are common to the similar forms, and thus very different from mimicry in which the resemblances are primary and have been brought about for their own sake.

(2) Visible resemblances are not only brought about by adaptation to similar dynamic conditions, but also to similar static conditions. Thus many insects resemble lichen or bark, and therefore incidentally resemble each other. Equally good examples are to be found among the distantly related caterpillars which resemble each other because of their likeness to the pine-needles or grasses on which they feed. Here, too, the resemblances between the species are secondary, being the incidental results of 'common protective or aggressive resemblance,' or, as they may be called, to follow the same terminology, *syncryptic* (*σὺν*, together, and *κρυπτός*, hidden), the noun being *syncrypse*; together with *symprocryptic* and *synanticryptic*, according as the common resemblance to surroundings is for the purpose of defence or attack.

(3) Visible resemblances are also produced by 'common warning or synaposematic colours,' in which specially defended animals gain advantage by a common advertisement. The resemblances between butterflies believed to be nauseous was pointed out by H. W. Bates (loc. cit.); but the explanation was due to Fritz Müller (*Kosmos*, May, 1879, 100), who pointed out the saving of life which would result from a common appearance in the period during which youthful enemies are being educated to avoid the distasteful or dangerous forms having a similar appearance. This class of resemblance has much in common with mimicry, and is often called 'Müllerian mimicry.' It has also been spoken of as 'mimicry between protected species,' but it is clear that its true position is in the group of WARNING COLOURS (q. v.).

(4) Finally, we have the resemblance of a species which is not specially protected to one which gains comparative immunity from the possession of some unusual mode of defence.

In this case, the latter is called the model and the former the mimic. Mimicry thus becomes a case of 'false warning and signalling or pseudosematic colours,' and is distinguished from protective (and aggressive) resemblance, because in the latter an animal resembles something which is of no interest to its enemies (or prey), and is thus concealed; while in the former it resembles (pseudaposematic) something which its enemy positively fears or dislikes (or conversely—pseudepisematic—which its prey positively desires or seeks), and thus becomes conspicuous. There are cases, however, in which not very conspicuous models are mimicked, as in the likeness of the dipterous insect *Eristalis* to the bee.

The resemblances of mimicry are superficial, but deep-rooted structural changes are often necessary in order to bring them about. Thus resemblances of habit and attitude are as characteristic of mimicry as resemblances of form. The use of the term mimicry, which sometimes implies conscious IMITATION (q. v.), has been a fruitful source of confusion. According to the theory suggested by Bates, the resemblances are due to the operation of natural selection, which preserves the variations which tend in the direction of the model and are thus mistaken for unpalatable or dangerous forms, and eliminates others. Cf. CONVERGENCE. (E.B.P.)

The following classification shows the relation of mimicry to the other uses of the colours of animals, according to Poulton :—

I. APATETIC COLOURS.

- A. *Cryptic colours.*
  - 1. *Procryptic.* Protective resemblances
  - 2. *Anticryptic.* Aggressive resemblances.
- B. *Pseudosematic colours.*
  - 1. *Pseudaposematic.* Protective mimicry (Batesian).
  - 2. *Pseudepisematic.* Aggressive mimicry and alluring colours.

II. Sematic Colours.
  1. *Aposematic.* Warning colours.
  2. *Synaposematic.* Common warning colours in different species (Müllerian mimicry).
  3. *Episematic.* Recognition markings.
III. Epigamic Colours. Colours displayed in courtship.

In opposition to a theory of mimicry based on natural selection exclusively the following possibilities have been suggested :—

(1) That the similar direct action of the environment may produce similar effects on different organisms during their individual lives.

(2) That internal developmental causes may lead to similar organic products either directly (cf. Orthogenesis) or indirectly.

(3) That the psychical influence of predominating types of colour and pattern may lead to a preference for these types, rendered effective in heredity through sexual selection of those organisms in which these types are developed.

(4) That there may be (*a*) a direct physiological response to constant mental experiences, such as sensations of colour, working in both the species in question, and giving mimetic results; or (*b*) direct conscious imitation in habits, &c. (e.g. in the securing of food), which produce such physiological effects. A psychological view was held by Erasmus Darwin, 1794 (*Zoonomia*, 297; cited by Delage).

(5) It has been held (Plateau, *Bull. de l'Acad. Roy. de Belg.*, 3e sér., xxiii. No. 2; also Delage, *Structure du Protoplasma*, 377) that the phenomena are simply coincidences.

In discussing the subject the following points should be borne in mind: first, that the resemblances in question are superficial; second, that they are often found in the female sex only; and third, that they are produced by organic changes, which occur in very diverse ways. (C.Ll.M.–J.M.B.)

Literature: H. W. Bates, Contributions to an Insect Fauna of the Amazon Valley, Linn. Soc. Trans., xxiii; A. R. Wallace, On the Phenomena of Variation and Geographical Distribution as illustrated by the Papilionidae of the Malayan Region, Linn. Soc. Trans., xxv; Darwinism; and Essays on Natural Selection; R. Trimen, On some Remarkable Mimetic Analogies among African Butterflies, Linn. Soc. Trans., xxvi; Presidential Address, Proc. Entomol. Soc. (1897); and Science, April 1, 1898; F. Müller, Ituna and Thyridia—a Remarkable Case of Mimicry in Butterflies, Kosmos, trans. in Entomol. Soc. Proc. (1879); R. Meldola, On Mimicry between Butterflies of Protected Genera, Ann. and Mag. Nat. Hist. (Dec., 1882); F. Moore, A Monograph of Limnaina and Euploeina, Proc. Zool. Soc. (1883); E. B. Poulton, The Experimental Proof of the Protective Value of Colours and Markings in Insects, Proc. Zool. Soc. (1887); Natural Selection the Cause of Mimetic Resemblance, &c., J. Linn. Soc. (1898); and Colours of Animals (1890); Delage, Struct. du Protoplasma; and Année Biologique, i. ff. (annual résumé). (E.B.P.–J.M.B.)

Mimicry (in psychology): Ger. *Mimik*; Fr. *mimique*; Ital. *mimica*. The phenomena described under Mimetism (2) (q.v.), particularly those of plastic Imitation (q.v.). (J.M.B., G.F.S.)

Mind (in philosophy) [Lat. *mens*]: Ger. *Geist*; Fr. *esprit*; Ital. *spirito*. Used in general antithesis to matter, to cover that phase of reality which does not permit of exclusive interpretation in terms of matter in motion, but allows or requires the hypothesis of something analogous to conscious process.

The older use included specifically the attributes of personal consciousness, as in the controversy on Teleology (q.v.), where 'mind in nature' really meant mind outside of nature, which showed its power, design, &c., in the creation and ordering of nature. This ascription of consciousness to mind shows itself in Leibnitz's monads, which have the power of 'presentation,' and in the development of Cartesianism, culminating in the dualism of the attributes of extension and thought of Spinoza. Spinoza's substance, however, may possibly be considered—at least logically—the mediating doctrine from this more anthropomorphic earlier meaning to the various later idealistic uses of the term. In recent idealism the contrast, viewed empirically, is between mechanism and mind; and the latter is anything which is left over in nature—increased organization, teleological progress, &c.—after mechanical explanations have exhausted themselves, and which the analogy from conscious process may be called upon to explain. These idealistic theories vary greatly the creationism which holds that mind produces but is not itself mechanism; the transcendent, immanent view which makes mind partly immanent in nature and partly apart from it; the identity view which allows full sweep to mechanical explanations but holds that nature may be reinterpreted as mind; and finally, the view of the Hegelian 'absolute' mind (Geist), which is the reconciliation and unity of 'subjective' (conscious) mind and 'objective' mind (mechanical nature). In

the more immanental systems, mind—for which thought and spirit are interchangeably used—becomes a sort of limiting notion or explaining category, at the same time that its concrete determination in terms of consciousness is denied or not attempted. Hegel's 'thought,' Schopenhauer's 'will,' Bradley's 'sentience,' are each in its way similarly a limiting notion of some one phase of mind thus understood. Cf. SOUL, SPIRIT, and the next topic. For the various philosophers' usage see numerous citations in Eisler, *Wörterb. d. philos. Begriffe*, 'Geist,' 'Seele.' (J.M.B., J.D.)

Mind (in psychology) [Lat. *mens*]: Ger. *Seele*; Fr. *esprit*; Ital. *mente*. The individual's conscious process, together with the dispositions and predispositions which condition it. It is thus the individual's consciousness, with its capabilities; its capabilities including all faculties, powers, capacities, aptitudes, and dispositions, acquired and innate. (G.F.S.–J.M.B.)

The necessity of including both clauses of the definition is seen in the fact that the subjective and objective determinations of mind do not run entirely parallel. Subjectively, we have everything conscious, and nothing else mental; objectively, we have to ask whether all the phenomena which seem to afford evidence of mind, by resembling the performances of consciousness, really do involve consciousness. The objective question, Is consciousness coextensive with mind? is often answered in the negative; and it is forcing its way into the psychological theories in the form of the hypothesis of unconscious mental modifications, dispositions, &c. Mind looked at objectively must include phenomena which are present when consciousness is present; but there may be a deeper aspect of intelligence, feeling, or will (each has been held) than that form which shows itself in individual consciousness. The definition should at any rate leave open the discussion of this possibility, together with the possible recognition of those factors, themselves not in personal consciousness, without which, however, the flow of consciousness would not be what it is.

For the relation of mind to SOUL and SPIRIT, the definitions given under those topics may be compared with this one. Mind has become the psychological word for the phenomenally presented or immediately given series of changes occurring in consciousness and in time. Soul has come to be limited to a mental substance in some way existing as a permanent unity behind the phenomena of mind. Spirit is largely confined to theological writers, who use it either as synonymous with soul or attempt a distinction according to which spirit is a sort of second soul which is the bearer of the higher ideal, intuitive, ethical, and religious faculties or functions. For the usage in the foreign languages cf. PNEUMA, PSYCHE, SOUL, and SPIRIT, and see TERMINOLOGY, German, 'Geist,' and French, 'Âme'; and for classical usage (Lat. *mens*, *anima*, *spiritus*; and Gr. *ψυχή*, *νοῦς*, *πνεῦμα*) consult the respective indices in Vol. ii. For more philosophical usages see MIND (in philosophy), and SPIRIT.

Literature: see the general treatises on PSYCHOLOGY and EPISTEMOLOGY, and the titles in BIBLIOG. G, 2, *o*. (J.M.B.)

Mind and Body: Ger. *Körper und Geist*; Fr. *le corps et l'esprit*; Ital. *corpo e spirito*. The phrase used currently to indicate the problem of the sort of reality which is to be attributed to mind and body respectively in relation to each other.

Every philosophical theory finds itself face to face with this question; and certain of the profoundest solutions date back to Greek thought (Anaxagoras' theory of the *νοῦς*—see NOUS—and the view of Aristotle as given under MATTER AND FORM, and as involved in the distinction between *δύναμις* and *ἐνέργεια*—see POWER). The various theories now current reflect essentially different ways of approaching the question, and their presuppositions are so different that it is only with respect to their conclusions that they can be compared with one another. There is, first of all, the class of dualistic theories—holding to the assumption of two real forms of existence, mind and body, and asking how and to what extent these two real existences can stand in relation to each other. These theories may be divided into the epistemological and the genetic, the former finding its basis in a dualism of knowledge of mind and body respectively, and the latter in the actual distinction of the two as formulated in the history of culture, and in the naïve progress of the individual's mental development. Under the former head we have the *influxus physicus* or CAUSE THEORY (q. v.), psychophysical PARALLELISM (q. v.), the theories of PRE-ESTABLISHED HARMONY (q. v.), and OCCASIONALISM (q. v.). Genetic theories, on the other hand, hold either to a dualism which is necessary in the evolution of human thought, and for this and other reasons also valid, or make this dualism a matter merely of naïve

thinking, necessary for a practical view of the world, but open to criticism. Here we find the discussions of INTROJECTION (q. v.), EJECTION (q. v.), &c.—attempts to trace the rise and progress of the antithesis between mind and body.

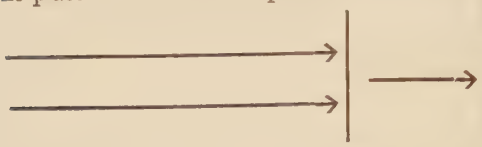
The second great class, the monistic theories, are, for the most part, philosophical, resulting in their turn either from a refutation of dualism in epistemology, or a transcending of the genetic dualism of naïve thought. Under the former we have the idealistic theories generally, including those of spiritual MONISM (q. v.), PANPSYCHISM (q. v.), and MIND-DUST (q. v.); the materialistic theories, including the EPIPHENOMENON (q. v.) and AUTOMATON (q. v.) theories (see AUTOMATIC AND AUTOMATISM), and the DOUBLE ASPECT THEORY (q. v.), which, while agnostic in its attitude towards the monistic principle, nevertheless denies dualism in principle.

The logical alternatives of the case are not exhausted, however, as between dualism of body *and* mind, on the one hand, and monism of body *or* mind on the other hand; that is, it is not necessary logically to hold that we must believe either that consciousness modifies the brain processes and so violates the law of conservation of energy—giving two interacting realities — or that consciousness is an epiphenomenon and the psychophysical individual an automaton. This reduction of the possible views to two is unnecessary and illogical. In speaking of the antecedents of a voluntary movement—the case whose interpretation brings up the whole question—we have to consider the entire group of phenomenal events which are always there when voluntary movement takes place; and among the phenomena really there, the conscious state called volition is really there. To say that the same movement could take place without this state of consciousness is to say that a lesser group of phenomenal antecedents occurs in some cases and a larger group in other cases of the same event. Why not go to the other extreme, and say that the brain is not necessary to voluntary movement, since volition could bring about the movement without using the nervous processes to do it with? In his posthumous book on *Mind, Matter, and Monism*, Romanes brings out this inadequacy of the automaton view, using the figure of an electro-magnet, which attracts iron-filings only when it is magnetized by the current of electricity. Whatever the electricity be, the magnet is a magnet only when it attracts iron-filings; to say that it might do as much without the electricity would be to deny that it is a magnet; and the proof is found simply in the fact that it does not attract iron-filings when the current is not there. So the brain is not a brain when consciousness is not there; it could not produce voluntary movement because, as a matter of fact, it simply does not. So consciousness does not, on the other hand, produce movement without a brain.

The whole difficulty seems to lie in the inadequate analysis which limits the cause to the physical changes preceding the movement. Such a conception as physical causation cannot be applied beyond the sphere of things in which it has become the explaining principle—i.e. in the objective, external world of things. The moment we ask questions concerning a group of phenomena which include more than these things, that moment we are liable to some new statement of the law of change in the group as a whole. Such a statement is the *third alternative* in this case additional to dualism of mind and body and monism of either.

The other extreme is represented by those writers who think that the revision of the law of causation can be made in the sphere of objective phenomenal action represented by the brain; and so claim that there is a violation of the principle of conservation of energy in a voluntary movement, an actual efficiency of some kind in consciousness itself for producing physical effects—the dualistic view. This is as illegitimate as the other. It seems to deny the results of all objective empirical science, and so to sweep away on one side the statements of law on which the higher interpretation of the group of phenomena as a whole must be based. And it does it in favour of an equally empirical statement of law on the other side. It is not easy to see how any result for the more complex system of events can be reached if we deny the only principles which we have in the partial groups. To do so is to attempt to interpret the objective in terms of the subjective factor in the entire group; and we reach by so doing a result which is just as partial as that which the epiphenomenon theory reaches in its mechanical explanation. Lotze made this mistake, but his hesitations on the subject showed that he appreciated the difficulty. The claim of these writers that the mechanical view of causation cannot be used as an adequate explaining principle of the

whole personality of man seems good; but for reasons of much the same kind, it seems equally true that as long as we are talking of events of the external kind, i.e. of brain processes, we cannot deny what we know of these events as such, and give such knowledge no place in our final interpretation.



The general state of the problem may be shown by the accompanying diagram, which will at any rate serve the modest purpose of indicating the alternatives. The upper line of the two parallels may represent the statements on the psychological side which mental science has a right to make respecting the determination of mental change; the lower of the parallels may represent the corresponding series of statements made by physics and natural science, including the chemistry and physiology of the brain. Where they stop, an upright line may be drawn to indicate the setting of the problem of interpretation, in which both series of statements claim to be true; and the further line to the right then gives the phenomena and statements of them which we have to deal with when we come to consider man as a whole. Now our point is that we cannot deny either of the parallel lines in dealing with the phenomena of the single line to the right, nor can we take either of them as a sufficient statement of the further problem which the line to the right proposes. To take the line representing the mechanical principles of nature, and extend it alone beyond the upright, is to throw out of nature the whole series of phenomena which belong in the upper parallel line and do not lend themselves to statement in mechanical terms. And to extend the upper line alone beyond the upright is to allow that mechanical principles break down even in their own sphere, for the brain is a part of nature even when accompanied by a mind.

As to the interpretation of the single line to the right, it may always remain the problem that it now is. The best we can do is to get points of view regarding it; and the main progress of philosophy seems to be in getting an adequate sense of the conditions of the problem itself. From the more humble side of psychology, the growth of consciousness itself may teach us how the problem comes to be set in the form of seemingly irreconcilable antinomies, and this it is the merit of the genetic theories to have recognized. The person grows both in body and mind, and this growth has to have two sides—the side facing towards the past, the 'retrospective reference,' which embodies all determinations already made, and the side facing the future, the 'prospective reference' of growth, and of the consciousness of growth which anticipates further determination. The positive sciences have by their very nature to face backward, to look retrospectively, to be 'descriptive"—these give the lower of our parallel lines. The moral sciences, so called, on the other hand, deal with judgments, appreciations, organizations, expectations, and so represent the other, the 'prospective' mental attitude and its corresponding aspects of reality. This gives character largely to the upper one of our parallel lines. But to get a construction of the third line, the one to the right, is to ask for both these points of view at once; to stand at both ends of the line—at a point where description takes the place of prophecy, and where reality has nothing further to add to thought.

This third alternative is, accordingly, to think psychophysical change in a category under which both mechanical processes and ideal changes—the realization of ends and values—are present at once. And the problem becomes that of the interpretation of the world in general; how can a mechanical system be also teleological?—the issue of philosophy in which all the others are pooled, and on the general solution of which that of this problem must depend.

A question which is much discussed concerns the actual physiological process correlated with consciousness—that of the 'physical basis of consciousness'—but with little more than speculative results. Cf. the textbooks of psychology.

Literature: see the topics cited. Recent discussions are STUMPF, Pres. Address, Dritter int. Congr. f. Psychol. (1897), 3; WENTSCHER, Physische u. psychische Kausalität (1896); BERGMANN, Seele u. Leib, Arch. f. syst. Philos., iv. (1898) 401, and v. 25; REHMKE, Aussenwelt u. Innenwelt (1898); SCHWARZ, Verhältniss v. Leib u. Seele (1897); BUSSE, Zeitsch. f. Philos. u. phil. Kr., cxiv. (1899) 1; RICKERT, in Sigwart-Abhandlungen (1900); discussion by JAMES, LADD, BALDWIN, in Psychol. Rev., iii (1896). (J.M.B.)

Mind Cure: Ger. *Psychotherapie*; Fr. *guérison par la foi* (no exact equivalent—Tr. F.); Ital. *cura psichica* (or *morale*). A variety of systems, appearing in different ages, heralded under diverse auspices, and practised in adherence to special forms and theories, which have in common the element of curing disease mainly by mental influence.

Terminology in this field is embarrassing in its abundance and misleading in its special connotations. Three lines of interest may be distinguished with reference to this large subject. (1) The first relates to the proper interpretations of actual cures or relief effected by the influence of the mind on the body, and to the practical utilization of such influence in the scientific treatment of disease. This division of the subject is considered under the term PSYCHOTHERAPEUTICS (q. v.). (2) The historical and anthropological interest is centred in the accounts of cures by mental methods in past eras and among primitive peoples. At all times and in all stages of medical knowledge the cure of disease has not been wholly by physical means, but an appeal has been made to the patient's mental co-operation, either directly or more usually indirectly, by rites and ceremonies, by charms and mystic procedures, by exorcism and religious appeals and prayers, by pilgrimages to places of special sanctity or renown. A very important part of the life of primitive peoples is concerned with such practices; but their specific consideration would require an extensive treatment. The history of cures by the action of mind or faith is likewise a long one, and includes such diverse practices as the cure by the king's touch, the healing touch of divinely gifted persons, the action of charms and amulets, the efficacy of shrines and relics, of exorcism, prayers, and religious devotion, the elaborate procedures of mesmerism in its several forms (see HYPNOTISM), of 'electric tractors,' electro-biology, and an endless series of devices, cures, and systems. What is common to these various methods is that their success depends largely upon the judiciously excited belief and co-operation of the patient.

Literature, to (2): MAX BARTELS, Med. d. Naturvölker (1893); TYLOR, Primitive Culture; ELWORTHY, Evil Eye (1895); REGNAULT, La Sorcellerie (1897); ANDREW D. WHITE, Hist. of Warfare of Sci. with Theol. See also the references under FOLK-LORE, DEMONOMANIA, and MAGIC.

(3) To be specially classified are the systems which are established upon the doctrine that mental treatment is the sole or main factor in the cure of bodily ills. Such systems are mainly of recent origin and are known by various names: 'mind cure,' 'faith cure,' 'mental healing,' 'Christian science,' 'metaphysical healing,' &c. 'Christian science,' due to Mrs. Mary B. Eddy (see her book *Science and Health*, 1866–1900), has probably achieved the widest fame. Some of these systems are based upon strained interpretations of the world of matter; they teach the unreality of disease, the divine origin of health, the neglect of bodily symptoms as unreal, and the like. Ignoring or misinterpreting, as they do, the tenets of physiology and psychology, such systems must be pronounced essentially unscientific; and the practices which arise from them are liable to lead to serious injury. On the other hand, the importance of utilizing in a judicious and properly subordinated form the element which such systems set forth in an exaggerated and perverted fashion is being more generally recognized by the medical practitioner. Kant's *Von der Macht des Gemüths* contains early suggestions. Cf. PSYCHOTHERAPEUTICS.

Literature: FERNALD, Pop. Sci. Mo., xxxiv, 798; PURRINGTON, Christ. Sci. (1900); BUCKLEY, Christ. Sci. and other Superstitions (1899); GODDARD, Effects of Mind on Body, Amer. J. of Psychol., x. 431; JASTROW, 'The Modern Occult,' in Fact and Fable in Psychol. (1900). (J. J.)

Mind-dust Theory: Ger. *Theorie der psychischen Atomen*; Fr. *théorie des atomes mentaux*; Ital. *teoria degl' elementi psichici, atomismo psichico*. The COMPOSITION THEORY (q. v.) of mind in the form which holds that there are particles or atoms ('dust') of mind everywhere in nature, accompanying material atoms, and on suitable occasions forming the 'stuff' of conscious mind as postulated by the MIND-STUFF THEORY (q. v.). It may be called 'psychological atomism' in contrast with the psychic or mental atomism of the composition theory. For a recent statement, see Münsterberg, *Psychol. Rev.*, vii, 1900, 1.

Ll. Morgan has postulated what he calls 'metakinesis,' something higher than 'kinesis' (matter in motion), as analogous in the inorganic world to consciousness in the organic.

Literature: see under MIND-STUFF THEORY, and COMPOSITION THEORY; especially SPENCER, Princ. of Psychol., i. §§ 179, 195; JAMES, Princ. of Psychol., chap. vi (with many citations); also ROMANES, Mind, Matter, and Monism;

Ll. Morgan, Nature, xliv. 319; Karl Pearson, Grammar of Sci., 2nd ed., chap. ix; Ardigò, L'Unità della Coscienza; Ueberweg-Heinze, Hist. of Philos., III. ii. 419. (J.M.B.)

Mind Reading: see Muscle Reading, and Telepathy.

Mind-stuff Theory: Ger. *Theorie des psychischen Stoffes* (or *der Seelenzellen*, Haeckel); Fr. *théorie de la matière mentale* (no exact equivalent—Th. F.); Ital. *teoria della materia psichica* (or *mente-sostanza*). The Composition Theory (q. v.) of mind combined with a further speculation: it is assumed that the ultimate units which enter into the composition of mental states constitute also what appears to us as matter. The elements of mind-stuff are thus a form of psychical Monad (q. v.).

Literature: the phrase Mind-stuff Theory was first used by W. K. Clifford in Mind (O.S.), iii. 57. The best reference is James, Princ. of Psychol., i. 159, who cites (with many others) G. T. Fechner, Psychophysik, ii. chap. xlv; H. Taine, On Intelligence, Bk. III; E. Haeckel, Zellseelen u. Seelenzellen, in Gesammelte pop. Vorträge (1st ed.), 143; J. Soury, art. Hylozoismus, in Kosmos, 5. Jahrg., H. 10, 241; Whittaker, Mind (O.S.), vi. 498 (historical); Morton Prince, The Nature of Mind and Human Automatism (1885); A. Riehl, Der philosophische Kriticismus, ii., Theil 2, II. Abschnitt, 2. Cap. (1887); Royce, Mind (O.S.), vi. 376. See also Composition Theory. (G.F.S.–J.M.B.)

Minimum divisibile [Lat.]. The quantity which, the result of successive division, is itself indivisible. See Divisibility. (J.M.B.)

Minimum (or **Minimal**) **Sensation:** see Limits of Sensation.

Minor [Lat. *minor*, the lesser]: Ger. *Moll*; Fr. *mineur*; Ital. *minore*. One of the two fundamental scales or keys of modern music characterized by the presence of the minor third above the fundamental.

Expressed in 'whole tones,' it runs: Harmonic form: 1, 1–2, 1, 1, 1–2, 1 and 1–2, 1–2. Melodic form, ascending: 1, 1–2, 1, 1, 1, 1, 1–2; descending, 1, 1, 1–2, 1, 1, 1–2, 1. Cf. Helmholtz, *Sensations of Tone* (Eng. trans.), 274, 288; Cummings, *Rudiments of Music*, 47. For minor intervals, &c., see Major. (E.B.T.)

Minor (in logic): see Major and Minor.

Minucius Felix: see Patristic Philosophy (4).

Mirabaud, Jean-Baptiste de. (1674–1760.) Born in Paris and intended for the army, he became the friend of La Fontaine, and was won over to the study of literature. He became a member of the Oratory, and soon afterwards secretary of the duchess of Orleans and the instructor of her daughter. A translation of Tasso's *Jerusalem Delivered* secured for him entrance into the Academy, and in 1742 he became its perpetual secretary.

Miracle [Lat. *miraculum*, a wonder]: Ger. *Wunder*; Fr. *miracle*; Ital. *miracolo*. An event which, on account of its unusual character, is assumed to be beyond the recognized powers of nature and man, and therefore the product or manifestation of supernatural agency, of which it also serves as a sign and witness.

The miracle is a part of the system of supernaturalism, and stands or falls with it. Assuming the possibility of a miracle, the questions of fact and of definition remain. Believers in supernatural religion accept the fact, and are only interested in the question of the true conception of a miracle. The early and mediaeval theologians agree in conceiving the miraculous as being above but not contrary to nature. The question entered on a new phase when Hume defined a miracle as a violation of nature, and asserted the impossibility of substantiating its actual occurrence. The modern discussion has proceeded largely in view of Hume's destructive criticism. The miracle as a part of the Christian scheme is held to be an attestation of the supernatural claims of Christianity, though opinions differ as to its evidential value. Early designations of the miracle were wonder (*σημεῖον*) and prodigy.

Literature: Hume, Essays, ii; R. Wardlaw, Miracles (N. Y., 1853); Bushnell, Nature and the Supernatural; Baden Powell, The Order of Nature (London, 1859); J. McCosh, The Supernatural in relation to the Natural (London, 1862); J. Köstlin, De Miraculorum quae Christus, &c. (1860); G. P. Fisher, Grounds of Theistic and Christian Belief (1883). (A.T.O.)

Mirror Writing: Ger. *Spiegelschrift*; Fr. *écriture en miroir*; Ital. *scrittura a specchio*. Reversed handwriting as seen when ordinary writing is held before a mirror; it, in turn, becomes legible, as ordinary writing, when seen in a mirror. It may be produced by pressing clean blotting-paper on heavy writing when the ink is still wet.

Mirror writing is sometimes produced by young children whose writing is still forming;

seen fragmentarily in the reversal, and even the up-or-down-turning, of single letters, figures, &c., and in the writing with the left hand of many adults who write normally with the right hand. A simple test is: starting with both hands together before the body, trace one's autograph naturally with each index-finger in mid-air. In many cases of right-handed persons the left hand then inscribes mirror writing more naturally than correct writing, performing movements symmetrical with those of the right hand, rather than analogous to them; that is, moving away from the right hand rather than following it.

Mirror writing furnishes an important problem to theorists on HANDWRITING (q.v.). It is probably due in children to the incomplete association of the series of hand-movement sensations with the control series of visual sensations. In some the hand unaccustomed to writing reproduces the muscular series to which the other hand is accustomed (symmetrical accompanying movements); this is in persons who think of writing mainly in terms of the muscular sensation series. Others, who do not produce mirror writing, think on the contrary of the visual form of the words, and so reproduce that, giving a correct imitation of the other hand (analogous accompanying movements).

Literature: see HANDWRITING, GRAPHOLOGY, and Agraphia under SPEECH AND ITS DEFECTS. (J.M.B.)

Misdemeanour (in law) [OF. *mesdemener*]: Ger. *Vergehen, Uebelverhalten*; Fr. *délit*, and for petty offences *contravention* (*Code Pénal*, 1); Ital. *contravvenzione*. A crime less than a felony; a minor offence. 'In common usage the word "crimes" is made to denote such offences as are of a deeper and more atrocious dye; while smaller faults and omissions of less consequence are comprised under the gentler name of "misdemeanours" only' (Blackstone's *Commentaries*, iv. 4). (S.E.B.)

Misology [Gr. μισεῖν, to hate, + λόγος, reason]: Ger. *Misologie*; Fr. *misologie*; Ital. *misologia*. Hatred and despair of reason. Sometimes applied to intellectual PESSIMISM (q.v.). (J.M.B.)

Missing Link: the immediate ancestor of man. See ANTHROPOID, ad fin.

Mitosis [Gr. μίτος, a thread]: Ger. *Mitose*; Fr. *mitose*; Ital. *mitosi*. The indirect mode of nuclear division, to which the term karyokinesis is also applied.

The chromatin of the nucleus forms a thread, which breaks up into a number of separate CHROMOSOMES (q.v.); these become split each into two halves, which travel to the opposite poles of the achromatic spindle (amphiaster), where they become reconstituted into the two daughter nuclei. Mitosis is the ordinary mode of nuclear division, and is found, with but little variation, in the cell division of the Protozoa and Metazoa, and of plants also. Cf. CELL THEORY (also for literature), AMITOSIS, and NUCLEUS. (E.S.G.)

Mixed [Lat. *mixtum*, from *miscere*, to mix]: Ger. *vermischt*; Fr. *composé*; Ital. *misto*. (1) Mixed proof: a proof which is partly analytic, partly synthetic.

(2) Mixed mode: a mode compounded of simple ideas of several kinds, put together to make one complex one (Locke, *Essay concerning Human Understanding*, Bk. II. chap. xii. § 5). See MODE.

(3) Mixed power: a power at once active and passive, because the principle of change is in itself. (C.S.P.)

Mixture (linguistic): Ger. *Mischung*; Fr. *mêlange*; Ital. *mescolanza, miscela*. Applied to the results of the borrowing from one language to another of words or other speech-elements.

Languages influence each other through individuals speaking two or more languages. Words of one language are fitted into the sentence framework of another. An inflectional or formative element cannot be 'borrowed,' i.e. become a loan-element, unless enough words containing it are borrowed to fix such element as an independent existence in the consciousness of the speech-community. In bilingual communities it is noticed that the tendency is for a single sentence-mould to suffice for two languages. This tendency to use a single mould of syntax with various vocabularies has brought about the 'modernizing' of the syntax of all European languages. (B.I.W.)

Mnemonic Verses and Words (in logic). Aids to memory in logic, of the sort described under MNEMONICS (q.v.). (J.M.B.)

1. Instrumenta novem sunt, guttur, lingua, palatum
Quattuor et dentes, et duo labra simul.

The following mnemonic verses are contained in the *Summulae Logicales* of Petrus Hispanus, but were older, perhaps very much older.

2. 'Quae?' ca. vel hyp., 'Qualis?' ne. vel aff., u. 'Quanta?' univ. par. in. vel sing. [What is the substance of a proposition? categorical or hypothetical. What is its quality? negative

or affirmative. What is its quantity? universal, particular, indefinite, or singular.]

3. Simpliciter Fēcī, convertitur Ēvă per acci,
Āstō per contra: sic fit conversio tota.
Asserit *Ā*, negat *Ē*, sēd universaliter ambae;
Asserit *Ī*, negat *Ō*, sed particulariter ambo.

[*E* and *I* are converted simply; *E* and *A*, *per accidens*; *A* and *O*, *per contrapositionem*.]

4. Prae, contradic.; post, contra.; prae postque, subalter.
Non omnis, quidam non; omnis non, quasi nullus;
Non nullus, quidam; sed 'nullus non' valet 'omnis';
Non aliquis, nullus; 'non quidam non' valet 'omnis';
Non alter, neuter; 'neuter non' praestat 'uterque.'

[*Non* placed before *omnis* or *nullus* gives the contradictory proposition; placed after, the contrary; both before and after, the subalternate.]

5. Primus, Ămābīmūs; Ēdēntūlī que, secundus;
Tertius, Īllĭăcē; Pūrpŭrĕā, reliquus.
Destruit ū totum, sēd ā confirmat utrumque;
Destruit ē dictum, destruit ī que modum.
Omne necessăriāt; impossibilē, quasi nullus;
Possibilē, quidam; quidam non, possībile non.
Ē dictum negat, ī que modum, nihil ā, sed ŭ totum.

[The first syllable of each of the four vocables *Amabīmus, Edentūli, Illiăce, Purpurĕa*, is for the possible mode; the second for the contingent; the third for the impossible; the fourth for the necessary. The vowel *a* signifies that both mode and 'dictum' are to be taken assertorically; *e*, that the dictum is to be denied; *i*, that the mode is to be denied; *u*, that both mode and dictum are to be denied. Each word refers to a line or order of equipollent modal forms.]

6. Tertius est quarto semper contrarius ordo.
Sit tibi linea subcontraria prima secundae.
Tertius est primo contradictorius ordo.
Pugnat cum quarto contradicendŏ secundus.
Prima subest quartae vice particularis habens se.
Hanc habet ad seriem se lege secunda sequentem.

[The relation of 'Sortem impossibile est currere' and 'Sortem necesse est currere' is that of contraries; they cannot be true at once. The relation 'Sortem possibile est currere' and 'Sortem possibile est non currere' is that of subcontraries; they cannot be false at once. The relation of 'Sortem possibile est currere' and 'Sortem impossibile est currere' is that of contradictories. The relation of 'Sortem possibile est non currere' and 'Sortem necesse est currere' is likewise that of contradictories. 'Sortem possibile est currere' follows from 'Sortem necesse est currere,' as does 'Sortem possibile est non currere' from 'Sortem impossibile est currere.']

7. Sub. prae. prima, secundā prae. bis, tertia sub. bis.

[The first figure contains the middle term as subject and predicate; the second, the middle as predicated twice; the third, the middle twice as subject.]

8. Bārbărā, Cēlārēnt, Dărīī, Fĕrĭō, Bărălīpton,
Cēlāntēs, Dăbĭtīs, Fāpēsmō, Frīsĕsōmōrum.
Cēsărĕ, Cāmēstrēs, Fēstīnŏ, Bărōkŏ, Dărāpti,
Fēlāptōn, Dīsămīs, Dātīsĭ, Bŏkārdŏ, Fĕrīson.

[These are original names of the syllogistic moods, which there is no sufficient reason for abandoning. The direct moods of the first figure are recognizable by their containing no sign of conversion, *s*, *p*, or *k*; the indirect moods (or moods of the fourth figure) by their having those signs attached either to the third vowel or to the first two. In the second figure, one of the signs *s*, *p* is attached to the first vowel, or to the second and third, or *k* is attached to the second. In the names of the moods of the third figure, *s* or *p* is attached to the second vowel, or to the first and third, or *k* to the first. There are also names for syllogisms with weakened conclusions or strengthened premises, as well as for indirect moods of the first figure considered as belonging to a fourth. But the above rules will enable a reader to identify them. Thus, *Bramantip* can be nothing but *Baralipton*; while *Barbari* is *Barbara* with a weakened conclusion. *Camenes* can be nothing but *Celantes*; *Dimaris* nothing but *Dabitis*; *Fesapo* nothing but *Fapesmo*; *Fresison* nothing but *Frisesomorum*. A writer who introduces an *m* into the name of a mood containing an *s* or *p* only after its third vowel, or who omits *m* from the name of a mood

having *s* or *p* after the first and second vowels, uses the fourth figure.]

9. Simpliciter vult *s*, verti *p* verŏ per acci.
M vult transponi, *k* per impossĭbile duci.
Servat maiorem variatque secunda minorem;
Tertia maiorem variat servatque minorem.

[*s*, in the name of a mood, shows that the proposition denoted by the preceding vowel is, in a preferred mode of reduction, to be converted simply; *p*, that it is to be converted *per accidens*; *m* shows that the premises are to be transposed; *k*, that the preferred reduction is by reduction of the contradictory of the conclusion to an absurdity, this contradictory of the conclusion being, in the second figure, put in place of the minor premise (the major being retained), and in the third figure in the place of the major (the minor being retained).]

A great number of other memorial words and verses have been proposed by logicians. (C.S.P.)

Mnemonics [Gr. *μνημονικός*, pertaining to memory]: Ger. *Mnemonik, Gedächtnisskunst*; Fr. *mnémotechnie*; Ital. *mnemonica, mnemotecnica*. Mnemonics or memoria technica is the art of memory, a code of rules for remembering. 'The method consists usually in a framework learned mechanically, of which the mind is supposed to remain in permanent and secure possession. Then, whatever is to be remembered is deliberately associated by some fanciful analogy or connection with some part of this framework, and this connection thenceforward helps its recall' (James, *Princ. of Psychol.*, i. 668). (E.B.T.)

Mob [abb. of Lat. *mobilis*, mobile]: Ger. *Pöbel*; Fr. *populace, foule*; Ital. *plebaglia*. See CROWD. A 'rabble,' the most disreputable sort of mob, is designated in Ger. by *Gesindel*, in Fr. by *canaille*, and in Ital. by *marmaglia*. (J.M.B., E.M.)

Mobility [Lat. *mobilis*]: Ger. *Beweglichkeit*; Fr. *mobilité*; Ital. *mobilità*. That property of matter by virtue of which it may change its position in space unless impeded by other matter. (S.N.)

Modalism (in theology) [Lat. *modus*, manner]: Ger. *Modalismus*; Fr. *modalisme*; Ital. *modalismo*. The doctrine that the divine nature is unitary in both substance and personality, and that Father, Son, and Holy Spirit represent simply three different modes of temporal manifestation. See SABELLIANISM. (A.T.O.)

Modality [Lat. *modus*; see MODE]: Ger. *Modalität*; Fr. *modalité*; Ital. *modalità*. There is no agreement among logicians as to what modality consists in; but it is the logical qualification of a proposition or its copula, or the corresponding qualification of a fact or its form, in the ways expressed by the modes *possibile, impossibile, contingens, necessarium*.

Any qualification of a predication is a mode; and Hamilton says (*Lects. on Logic*, xiv) that 'all logicians' call any proposition affected by a mode a modal proposition. This, however, is going much too far; for not only has the term usually been restricted in practice, from the age of Abelard, when it first appeared, until now, to propositions qualified by the four modes 'possible,' 'impossible,' 'necessary,' and 'contingent,' with only occasional extension to any others, but positive testimonies to that effect might be cited in abundance.

The simplest account of modality is the scholastic, according to which the necessary (or impossible) proposition is a sort of universal proposition; the possible (or contingent, in the sense of not necessary) proposition, a sort of particular proposition. That is, to assert '*A* must be true' is to assert not only that *A* is true, but that *all* propositions analogous to *A* are true; and to assert '*A* may be true' is to assert only that *some* proposition analogous to *A* is true. If it be asked what is here meant by analogous propositions, the answer is—all those of a certain class which the conveniences of reasoning establish. Or we may say the propositions analogous to *A* are all those propositions which in some conceivable state of ignorance would be indistinguishable from *A*. Error is to be put out of the question; only ignorance is to be considered. This ignorance will consist in its subject being unable to reject certain potentially hypothetical states of the universe, each absolutely determinate in every respect, but all of which are, in fact, false. The aggregate of these unrejected falsities constitute the 'range of possibility,' or better, 'of ignorance.' Were there no ignorance, this aggregate would be reduced to zero. The state of knowledge supposed is, in necessary propositions, usually fictitious, in possible propositions more often the actual state of the speaker. The necessary proposition asserts that, in the assumed state of knowledge, there is no case in the whole range of ignorance in which the proposition is false. In this sense it may be said that an impossibility underlies

every necessity. The possible proposition asserts that there is a case in which it is true.

Various subtleties are encountered in the study of modality. Thus, when the thinker's own state of knowledge is the one whose range of ignorance is in question, the judgments '*A* is true' and '*A* must be true' are not logically equivalent, the latter asserting a fact which the former does not assert, although the fact of its assertion affords direct and conclusive evidence of its truth. The two are analogous to '*A* is true' and '*A* is true, and I say so'; which are readily shown not to be logically equivalent by denying each, when we get '*A* is false' and 'If *A* is true, I do not say so.'

In the necessary particular proposition and the possible universal proposition there is sometimes a distinction between the 'composite' and 'divided' senses. 'Some *S* must be *P*,' taken in the composite sense, means that there is no case, in the whole range of ignorance, where some *S or other* is not *P*; but taken in the divided sense, it means that there is some *S* which same *S* remains *P* throughout the whole range of ignorance. So 'Whatever *S* there may be may be *P*,' taken in the composite sense, means that there is, in the range of ignorance, some hypothetic state of things (or it may be the unidentifiable true state, though this can hardly be the only such case) in which there either is no *S*, or every *S* there is is *P*; while in the divided sense, it means that there is no *S* at all in any hypothetic state but what in some hypothetic state or other is *P*. When there is any such distinction, the divided sense asserts more than the composite in necessary particular propositions, and less in possible universal. But in most cases the individuals do not remain identifiable throughout the range of possibility, when the distinction falls to the ground. It never applies to necessary universal propositions or to possible particular propositions.

Some logicians say that '*S* may be *P*' is not a proposition at all, for it asserts nothing. But if it asserted nothing, no state of facts could falsify it, and consequently the denial of it would be absurd. Now let *S* be 'some self-contradictory proposition,' and let *P* be 'true.' Then the possible proposition is 'Some self-contradictory proposition may be true,' and its denial is 'No self-contradictory proposition can be true,' which can hardly be pronounced absurd. It is true that those logicians usually take the form '*S* may be *P*' in the copulative sense '*S* may be *P*, and *S* may not be *P*,' but this only makes it assert *more*, not *less*. The possible proposition, then, is a proposition. It not only must be admitted among logical forms, if they are to be adequate to represent all the facts of logic, but it plays a particularly important part in the theory of science. See Scientific Method. At the same time, according to the view of modality now under consideration, necessary and possible propositions are equipollent with certain assertory propositions; so that they do not differ from assertory propositions as universal and particular propositions differ from one another, but rather somewhat as hypothetical (i.e. conditional, copulative, and disjunctive), categorical, and relative propositions differ from one another—perhaps not quite so much.

According to this view, logically necessary and possible propositions relate to what might be known, without any knowledge whatever of the universe of discourse, but only with a perfectly distinct understanding of the meanings of words; geometrically necessary and possible propositions, to what a knowledge of the properties of space does or does not exclude; physical necessity, to what a knowledge of certain principles of physics does or does not exclude, &c. But when we say that of two collections one most be correspondentially greater than the other, but each cannot be correspondentially greater than the other, it has not been shown how this kind of necessity can be explained on the above principles.

The earliest theory of modality is Aristotle's, whose philosophy, indeed, consists mainly in a theory of modality. The student of Aristotle usually begins with the Categories; and the first thing that strikes him is the author's unconsciousness of any distinction between grammar and metaphysics, between modes of signifying and modes of being. When he comes to the *metaphysical* books, he finds that this is not so much an oversight as an assumed axiom; and that the whole philosophy regards the existing universe as a performance which has taken its rise from an antecedent ability. It is only in special cases that Aristotle distinguishes between a possibility and an ability, between a necessity and a constraint. In this, he is perhaps nearer the truth than the system of equipollencies set forth above.

Kant seems to have been the first to throw any light upon the subject. To the old dis-

tinction between logical and real possibility and necessity, he applied two new pairs of terms, analytic and synthetic, and subjective and objective. The following definitions (where every word is studied) certainly advanced the subject greatly:—

'1. Was mit den formalen Bedingungen der Erfahrung (der Anschauung und den Begriffen nach) übereinkommt, ist *möglich*.

'2. Was mit den materialen Bedingungen der Erfahrung (der Empfindung) zusammenhängt, ist *wirklich*.

'3. Dessen Zusammenhang mit dem Wirklichen nach allgemeinen Bedingungen der Erfahrung bestimmt ist, ist (existirt) *nothwendig*' (*Krit. d. reinen Vernunft*, 1st ed., 219).

Kant holds that all the general metaphysical conceptions applicable to experience are capable of being represented as in a diagram, by means of the image of time. Such diagrams he calls 'schemata.' The schema of the possible he makes to be the figure of anything at any instant. The schema of necessity is the figure of anything lasting through all time (ibid., 144, 145). He further states (ibid., 74, footnote; Jäsche's *Logik*, Einl. ix, and elsewhere) that the possible proposition is merely conceived but not judged, and is a work of the apprehension (Verstand); that the assertory proposition is judged, and is, so far, a work of the judgment; and that the necessary proposition is represented as determined by law, and is thus the work of the reason (Vernunft). He maintains that his deduction of the categories shows that, and how, the conceptions originally applicable to propositions can be extended to modes of being—constitutively, to being having reference to possible experience; regulatively, to being beyond the possibility of experience.

Hegel considers the syllogism to be the fundamental form of real being. He does not, however, undertake to work over, in the light of this idea, in any fundamental way, what is ordinarily called logic, but which, from his point of view, becomes merely subjective logic. He simply accepts Kant's table of functions of judgment, which is one of the most ill-considered performances in the whole history of philosophy. Consequently, what Hegel says upon this subject must not be considered as necessarily representing the legitimate outcome of his general position. His followers have been incompetent to do more. Rosenkranz (*Wissenschaft d. logischen Idee*) makes modality to represent the superseding of the form of the judgment and to be the preparation for that of the syllogism. In the *Encyclopädie*, Hegel's last statement, §§ 178–80, we are given to understand that the judgment of the Begriff has for its contents the totality (or, say, conformity to an ideal). In the first instance, the subject is singular, and the predicate is the reflection of the particular object upon the universal. That is, this or that object forced upon us by experience is judged to conform to something in the realm of ideas. But when this is doubted, since the subject does not, in itself, involve any such reference to the ideal world, we have the 'possible' judgment, or judgment of doubt. But when the subject is referred to its genus, we get the apodictic judgment. But Hegel had already developed the ideas of possibility and necessity in the objective logic as categories of Wesen. In the *Encyclopädie* the development is somewhat as follows: Wirklichkeit is that whose mode of being consists in self-manifestation. As identity in general (the identity of Sein and Existenz) it is, in the first instance, possibility. That is to say, apparently, bare possibility, any fancy projected and regarded in the aspect of a fact. It is possible, for example, that the present Sultan may become the next Pope. But in the second movement arise the conceptions of the Zufällig, Aeusserlichkeit, and 'condition.' The Zufällig is that which is recognized as merely possible: '*A* may be, but *A* may not be'; but it is also described by Hegel as that which has the Grund, or antecedent of its being, in something other than itself. The Aeusserlichkeit seems to be the having a being outside the ground of its being—an idea assimilated to caprice. That which such Aeusserlichkeit supposes outside of itself, as the antecedent of its being, is the presupposed condition. The third movement gives, in the first instance, 'real possibility.' In this we find the conceptions of 'fact' (Sache), 'activity' (Thätigkeit), and 'necessity.'

Lotze and Trendelenburg represent the first struggles of German thought to rise from Hegelianism. The most remarkable characteristic of Lotze's thought is, that he not only sees no urgency for unity of conception in philosophy, but holds that such unity would inevitably involve a falsity. He represents a judgment as a means of apprehending becoming, in opposition to the concept, which apprehends being; but he says that the business of the judgment is to supply the

cement for building up concepts. Accordingly, he has no doctrine of modality as a whole, but merely considers three cases, between which he traces no relation. Necessity may arise either out of the universal analytic judgment, the conditional judgment, or the disjunctive judgment. By the 'judgment' is meant the meaning of a proposition. Lotze finds that the meaning of the analytical judgment is illogical, since it identifies contraries. However, the meaning of this meaning is justified by its not meaning to mean that the terms are identical, but only that the objects denoted by those terms are identical. The analytic proposition is, therefore, admissible, because it is practically meant to mean a particular proposition, that is, one in which the predicate is asserted of all the particulars. And the justification of the proposition, whose use was to be to connect elements of terms, is that, meant not as it is meant, but as it is meant to be meant, these elements are identical and do not need to be connected. In this way Lotze vindicates the necessity of the analytical categorical proposition. Coming next to conditionals, by thought of the same order, he finds that, assuming that the universe of real, intelligible objects is 'coherent,' we may be justified in asserting that the introduction of a condition X into a subject S gives rise to a predicate P as an analytical necessity; and for this purpose, when it is once accomplished, it does not matter whether the ladder of the assumption of coherence remains or is taken away. Lotze treats the disjunctive proposition last, as if it were of a higher order, following Hegel in this respect. But what was excusable for Hegel is less so for Lotze, since he himself had signalized the significance of impersonal propositions, such as 'it rains,' 'it thunders,' 'it lightens,' whose only subject is the universe. Now, if there is any difference between 'If it lightens, it thunders,' and 'Either it does not lighten or it thunders,' it is that the latter considers the actual state of things alone, and the former a whole range of other possibilities. However, Lotze considers last the propositional form 'S is P_1 or P_2 or P_3.' Properly, this is not a disjunctive proposition, but only a proposition with a disjunctive predicate. Lotze considers it a peculiar form, because it cannot be represented by an Euler's diagram, which is simply a blunder. The necessity to which it gives rise must, therefore, either be the same as the conditional necessity, or else differ from it merely by greater simplicity. For other sound objections to Lotze's theory see Lange, *Logische Studien*, ii.

Trendelenburg (*Logische Untersuch.*, xiii) maintains that possibility and necessity can only be defined in terms of the antecedent (Grund), though he might, perhaps, object to the translation of Grund by so purely formal a word as 'antecedent,' notwithstanding its harmony with Aristotle. If all conditions are recognized, and the fact is understood from its entire Grund, so that thought quite permeates being—a sort of phrase which Trendelenburg always seeks—there is 'necessity.' If, on the other hand, only some conditions are recognized, but what is wanting in Grund is made up in thought, there is 'possibility.' In itself, an egg is nothing but an egg, but for thought it may become a bird. Trendelenburg will, therefore, neither admit, with Kant, that modality is originally a mere question of the attitude of the mind, nor with Hegel, whom he criticizes acutely, that it is originally objective.

Sigwart, who holds that logical questions must ultimately be decided by immediate feeling, and that the usages of the German language are the best evidence of what that feeling is, denies that the possible proposition is a proposition at all, because it asserts nothing. He forgets that if a proposition asserts nothing, the denial of it must be absurd, since it must exclude every possibility. Now, the denial of 'I do not know but that A may be true' is 'I know A is not true,' which is hardly absurd. Sigwart, it is true, in accordance with usages of speech, takes 'A may be true' in what the old logicians called the *sensus usualis*, that is, for the copulative proposition 'A may be true, and further A may be not true.' But this does not make it assert *less*, but *more*, than the technical form. In regard to the necessary proposition, Sigwart, following his guide, the usages of speech, finds that 'A must be true' asserts less than 'A is true,' so that from the latter the former follows, but not at all the latter from the former. This may be true for the usages of German speech, just as such phrases as 'beyond every shadow of doubt,' 'out of all question,' and the like, in our vernacular commonly betray the fact that there is somebody who not only doubts and questions, but flatly denies, the proposition to which they are attached. Bradley accepts the sensational discovery of Sigwart.

Lange (loc. cit.) thinks the matter is put in the clearest light by the logical diagrams

usually attributed to Euler, but really going back to Vives. 'We, therefore, here again see,' he says, 'how spatial intuition, just as in geometry, verifies (begründet) a priority and necessity.' (C.S.P.)

Mode [Lat. *modus*, manner]: Ger. *Modus*; Fr. *mode*; Ital. *modo*. In general, the manner of the existence of a thing. It is equivalent in the generic sense to the terms attribute, quality, state, all of which have substance as their correlative. But the term mode specially emphasizes the aspect of mutability or variability in things, that is, the change from one state to another. Although a substance, therefore, must exist in some mode, any individual mode is regarded as accidental. In consequence of this emphasis upon the aspect of variability, a differentiation arises between the term attribute, as signifying the permanent and essential qualities of a substance, and mode, as signifying its more variable qualities or the varying forms in which the fundamental attributes express themselves.

This is the sense of the term mode in the Cartesian system, where it first acquires philosophical prominence. 'We have understood by modes,' says Descartes (*Principia Philos.*, i. proposition 56), 'the same as what we elsewhere designate attributes or qualities. , But when we consider substance as affected or varied by them, we use the term modes.' Besides God, to whom the term substance, in the sense of self-subsistent, is alone strictly applicable, there are for Descartes only two *summa genera* of things (or created substances), namely, minds or thinking things, and material or extended things. And of every substance, according to proposition 53, there is one principal property which constitutes its nature or essence, and upon which all the others depend. 'Thus extension constitutes the nature of corporeal substance, and is called *par excellence* its attribute, while the attribute of thought constitutes similarly the essence of thinking substance. For everything else that can be attributed to body presupposes extension, and is only some *mode* of an extended thing, as all the properties we discover in mind (such as imagination, sensation, or will) are only diverse modes of thinking.' Modes are thus modifications of the one fundamental attribute of substance. This is the distinction of substance, attribute, and mode which furnishes the framework of Spinoza's system, in which the substantiality of the *res extensae* and the *res cogitantes* disappears, individual minds becoming modes of the divine attribute of thought, and individual bodies modes of the divine attribute of extension.

Locke gave the term currency in English philosophy by his division of complex ideas into 'modes, substances, and relations.' Modes are 'such complex ideas which, however compounded, contain not in them the supposition of subsisting by themselves, but are considered as dependences on, or affections of, substances.' Locke apologises for using the word in a technical sense. Modes are then divided into simple and mixed. Simple modes are 'only variations or different combinations of the same simple idea, as a dozen or score, which are nothing but the ideas of so many distinct units added together.' Mixed modes contain 'a combination of several ideas of several kinds, e. g. beauty, theft' (*Essay* II, 12. 3–5). (A.S.P.P.)

Literature: Eisler, Wörterb. d. philos. Begriffe, 'Modus'; Höffding, Hist. of Mod. Philos. (and other Histories), Index. (J.M.B.)

Mode (in logic) [Lat. *modus*, trans. of Gk. *τρόπος*]. See Modality.

Model [Lat. *modulus*, dim. of *modus*, measure]: Ger. *Modell*, *Vorschrift*; Fr. *modèle*; Ital. *modello*. (1) In psychology: something held up for conscious Imitation (q. v.).

It is recommended that this term be in all cases employed for the matter set up for purposes of imitation (the usage of Taine, Tarde, Royce), the term Copy (q. v.) being used in the wider sense given it under that topic. The word 'example' is used in the four languages, especially with an ethical reference, for cases in which the model is explicitly chosen and pursued.

(2) In biology: see Mimicry (4).

Literature: see Imitation, and Mimicry. (J.M.B., G.F.S.)

Moderation. Sometimes used to render the Greek *σωφροσύνη*. See Temperance. (J.M.B.)

Modesty [Lat. *modestus*, moderate]: Ger. (1) *Bescheidenheit*; Fr. (1) *modestie*; Ital. (1) *modestia*. (1) The form of timidity or shyness due to reflective self-consciousness.

(2) A popular term for general lowliness of mind.

The demarcation of modesty off from the other forms of Shyness (q. v.) is difficult, especially in view of the confusions of popular usage. There is often an element, both in the conscious state and in the physical reaction of modesty, due to the particular exciting object, which may, at the same time, excite Shame or Coyness (see those terms); as, for example, when modesty is excited by physical indelicacy, which also produces shame.

Indeed, it is seldom that reflective emotion such as this is not complicated with special feelings and attitudes toward the object.

Literature: see SHYNESS. (J.M.B., G.F.S.)

Modification (in biology) [Lat. *modificatio*]: Ger. (*individuell erworbene*) *Abänderung* (Wundt); Fr. *modification*; Ital. *modificazione*. A structural change wrought during the individual's lifetime (or acquired), in contradistinction from variation, which is of germinal origin (or congenital).

The term was used sometimes, but not consistently, in this sense by Darwin. In the Darwinian phrase 'descent with modifications' the ambiguity is evident as between what is congenital and what acquired.

The distinction indicated in the definition has been rendered necessary by the discussion as to the inheritance of acquired characters. Modifications are acquired by the individual; whether they can be transferred to the germinal substance and thus become hereditary as variations is the problem under discussion. See ACQUIRED CHARACTERS, and HEREDITY. Organisms capable of extensive modification are termed plastic; and this PLASTICITY (q.v.) may be subject to selection. The term ACCOMMODATION (q.v.) is reserved by some writers for the moulding of behaviour to environing circumstances on the part of organisms, referring to function rather than to structure. On the hypothesis of ORGANIC SELECTION (q.v.) modifications of structure may serve to foster COINCIDENT VARIATIONS (q.v.) of like nature, and accommodations of behaviour may thus set the direction of congenital variation, and so of evolution under the action of natural selection.

Literature: LLOYD MORGAN, Habit and Instinct; J. MARK BALDWIN, A New Factor in Evolution, Amer. Natural., June–July, 1896; HEADLEY, The Problems of Evolution (1901). (C.LL.M.–J.M.B.)

Modification and Variation (mental). The same distinction between these terms is recommended as that given under MODIFICATION (in biology). Cf. VARIATION. (J.M.B.)

Modulus [Lat. *modus*, a mode]. (1) Proposed by Schröder (Ger. *Modul*; Fr. not in use; Ital. *modulo*, suggested—E.M.) for the four relative terms upon which the logic of dual RELATIVES (q.v.) hinges; namely, '**N**ot,' '**S**ame as,' '**E**xcluded from a universe containing,' and '**W**ith, or within a universe containing.'

These terms were first called by Peirce the 'definite dual relatives of second intention'; he now thinks it might be well to term these the four 'cardinals,' or four cardinal dual relatives.

Literature: PEIRCE, in Studies in Logic by Members of the Johns Hopkins University, 191, and Amer. J. Math., iii. 47; SCHRÖDER, Algebra d. Logik, iii. 117.

(2) See ERRORS OF OBSERVATION. (C.S.P.)

Modus ponens and **Modus tollens** [Lat.]. Two ways of reasoning from a conditional proposition or consequence. The *modus ponens* from the consequence and the antecedent infers the consequent; the *modus tollens* from the consequence and the falsity of the consequent infers the falsity of the antecedent, thus:

Modus Ponens.	*Modus Tollens.*
If A is true, C is true;	If A is true, C is true;
A is true;	C is false;
$\therefore C$ is true.	$\therefore A$ is false.

A third way of reasoning, namely, from the truth of the antecedent and falsity of the consequent to the falsity of the consequence, is generally overlooked. See HYPOTHETICAL (syllogism). (C.S.P.)

Mohammed, or **Mahomet**, or **Mahomed**, or **Muḥammed**. (cir. 570–632 A.D.) An Arabian prophet, born at Mecca. His father died about the time of Mohammed's birth, and his mother in his sixth year. He was raised by a grandfather and an uncle. The latter, Abu Talib, was his faithful friend and protector all through life. Accounts of Mohammed's youth are legendary: he probably tended flocks until his twenty-fifth year, when he entered the service of a rich widow named Chadidja, whom he married. In his fortieth year Mohammed saw his first 'vision' and received his 'message.' In four years he made forty proselytes, and it was revealed to him that he must preach openly. As his followers increased in numbers, he was forced to the most careful watchfulness to save his life. About 622 he moved to the friendly city of Medina, and the Mohammedan era dates from the first month of the following Arabic year. Mohammed now became the law-giver, judge, and ruler of Medina and of two powerful Arabian tribes. In the first year of the new era, he assumed hostilities against his enemies. War followed, and in the sixth year of the new era the first pilgrimage to Mecca was announced, but not carried out until the following year. The Meccans concluded peace with him, however, and he had become an equal power. His missionaries passed throughout Arabia, and even beyond its borders. Mohammed's forces being de-

feated in a battle with the Christians, the Meccans broke the peace-treaty. Mohammed defeated them, however, and his religion became supreme in Arabia. He was likewise successful against a combination of hostile tribes in the eighth year of the new era. Two years later, at the head of forty thousand Moslems, he made his last solemn pilgrimage to Mecca. See MOHAMMEDANISM.

Mohammedanism [Arab. *al-Islám*, the religion of 'self-surrender' or 'resignation' to God's will]: Ger. *Mahomedanismus* (*Islam*); Fr. *Mahométisme* (*Islam*); Ital. *Maomettismo* (*Islamismo*). It should be observed, however, that the Prophet, according to his own view and that of his followers, restored rather than created the religion of Islám, the faith of Abraham; and that hence the term *Muslim*—less correctly but more commonly written *Moslem*—is constantly applied by them to persons who lived before the time of Muḥammad or Mohammed (less correctly Mahomed, Mahomet). The religion founded by MOHAMMED (q. v.) may be defined as the latest of the great Semitic religions, teaching as its cardinal doctrines the Unity and Personality of God, the prophetic mission of Mohammed—'the last of the prophets and the seal of the prophets'—the plenary inspiration of the Qur'án (Koran, Coran), the resurrection of the body, and a system of rewards and punishments in a future life.

The simplicity of the Mohammedan confession of faith—'I bear witness that there is no god but God, and I bear witness that Mohammed is his servant and his apostle'—is at once its strength and its weakness; its strength, because the deliberate utterance of this formula is sufficient to secure to him who utters it the rights, privileges, and status of a Muslim; its weakness, because it may be, and has been, interpreted in the most diverse senses. Hence we find the wide diffusion of Islám amongst many races, including alike the most subtle and spiritual and the most stupid and material, corresponding with an immense variety of sects amongst its adherents; a fact fully recognized by the Muslims themselves in the oft-cited tradition: 'The Magians are divided into seventy sects, the Jews into seventy-one, the Christians into seventy-two, and the Muslims into seventy-three, of all which sects but one shall be saved'; and the tradition: 'My Church shall become divided into seventy-three sects, whereof but one shall be saved, while the rest shall perish.' Nor are the differences which separate some of these sects of a trivial character; the thorough-going pantheism of some of the Ṣúfís (see ṢÚFÍISM) stands at the opposite pole to the rigid monotheism of the orthodox followers of al-Ash'arí; the strong belief in free-will held by the Mu'tazilites (the dominant party under the early 'Abbásid caliphs) offers the sharpest contrast to the extreme predestinarianism (commonly regarded as an essential feature of Islám) which prevailed later; while amongst certain sects of the extreme Shí'ites (see SUNNÍTES AND SHÍ'ITES) the most grotesque forms of anthropomorphism and metempsychosis are to be found, notably amongst the Isma'ílís, Nusayrís, Druzes, Ḥurúfís, and certain of the Bábís.

If, however, we except Persia (which is, from the point of view of a Turk, Egyptian, Afghan, or Moor, almost entirely unorthodox), the ordinary orthodox Sunní doctrine teaches, in addition to the essentials already enunciated: (1) the plenary inspiration of the Qur'án, which is throughout regarded as the direct utterance of God, conveyed from time to time to the Prophet as occasion arose; (2) the resurrection of the dead, and the judgment and recompense of all mankind; (3) predestination of both good and evil; (4) the consummation and conclusion of the prophetic function in Mohammed; and the following obligations: (*a*) declaration of the divine unity; (*b*) prayer, preceded by ablution, at five specified periods of the day; (*c*) almsgiving; (*d*) fasting in the month of Ramaḍán; (*e*) pilgrimage to Mecca once at least in a lifetime, for all whose health and wealth enable them to undertake it. Abstinence from certain foods (notably pork, and all intoxicating drinks) is also obligatory; while circumcision, though not theoretically indispensable, is in practice universally observed.

The doctrines of Islám are based on, and deduced from, (1) the *Qur'án*, the Word of God; (2) the *Ḥadíth*, 'Traditions,' or sayings of the Prophet; and (3) the *Sunnat*, or practice of the Prophet, his 'companions,' and their immediate 'followers.' The Qur'án alone is not only insufficient for that minute regulation of every detail of daily life which Oriental peoples are prone to expect from their religion, but is, in fact, often inconsistent with itself, reflecting, in its various portions, the changing moods of the Prophet, and the very diverse circumstances of failure, success, hope, despair, and ultimate triumph in which at different epochs of his prophetic career (A.D. 610–32) he found himself. In

general, the earlier or Meccan *súras* (chapters) are shorter, more vigorous, less doctrinal, and in some respects (notably in their attitude towards the Jews and Christians) more tolerant than those revealed at Medina after the *hijra* (Hegira) or 'Flight' (A. D. 622); and since the 114 *súras* which constitute the Qur'án are arranged, on the whole, according to their length, the shortest coming last, it has been truly observed that he who would study the evolution of the Prophet's doctrine would do better to read them in inverse order than as they are now placed. These inconsistencies, however, did not greatly trouble the Arabs (an essentially practical people, little given to metaphysical speculations), to whom primarily Mohammed addressed himself; nor, in any case, were the stirring times in which he and his immediate disciples lived favourable to the elaboration of a complete theological system. This was reserved for their successors, more especially the non-Arabian peoples on whom the valour, ambition, and proselytizing zeal of the conquering Arab Muslims soon imposed the religion of Islám. Amongst these the Persians were conspicuous, and, as has often been observed, it was to them especially that the elaboration of what is often miscalled Arabian science and Arabian philosophy (see the topics to which reference is made under ARABIAN PHILOSOPHY) was due. Arabic, it must be remembered, was, for the first four or five centuries of Islám, the language not only of religion, but also of philosophy, science, poetry, and diplomacy throughout the Mohammedan world, and even at the present day in Persia it is still the vehicle in which serious treatises on religious or philosophical subjects are written; while the semi-Persian character of the 'Abbásid rule, which had its centre at Baghdad, and reached its zenith in 'the golden prime of good Haroun Alraschid,' is now generally recognized.

It was, then, by these more civilized and speculative peoples that the elaboration and synthesis of Mohammedan doctrine was effected. The inconsistencies of the Qur'án were removed by the science of 'the abrogating and the abrogated' (*násikh wa mansúkh*); and its deficiencies were supplemented by the collection and critical examination of a vast number of traditions as to how the Prophet and his companions behaved, and what they said and did, in various circumstances and emergencies. The older traditionists (of whom al-Bukhárí and Muslim are the most celebrated) spared no pains in the collection and selection of these traditions, gathered orally in many long and laborious journeys through Arabia; and though the severe critical method which they adopted proved fatal to the pretensions of the greater number, enough remained to form a basis for a pretty complete system of theology and jurisprudence. At a later date, when the critical faculty waxed weaker and a less honest and more partisan feeling prevailed, spurious traditions (often fabricated with some obvious political or polemical purpose) were freely coined: 'I have observed,' says a traditionist who died in A. D. 827, 'that the pious man is in nothing more ready to lie than in what concerns the Ḥadíth,' and the Shí'ite theologians are generally regarded as particularly open to criticism in this respect.

The earlier sects of Islám (Khárijites, Murjiyya, &c.), including most of the early Shí'ites, or partisans of 'Alí and his family, were mainly political, but the Mu'tazilites ('Separatists'), or 'partisans of the divine justice and divine unity,' as they called themselves, who were the dominant party under the early 'Abbásids (especially in the 9th century of our era), strongly opposed the separation of the Attributes from the Essence of God, the doctrine of predestination, the theory that the Qur'án was increate and existed from all eternity, and the beliefs that God could be seen with the eyes, and that wicked Muslims should not suffer eternal punishment, in all of which points they were in antagonism to the 'orthodox' party, which, for all their liberal tendencies, they vehemently persecuted. Favoured by the court of Baghdad, and armed with the logical weapons which they had borrowed from the Greek philosophers, they enjoyed for a long time undisputed superiority, both intellectual and political, over their opponents; and, had they been able to maintain their supremacy, the whole future history and development of Islám might have been very different, but unfortunately their political ascendency was checked by a change of view on the part of the caliphs, while the desertion from their ranks of the celebrated Ḥasan al-Ash'arí furnished their adversaries with the controversial weapons of which they had hitherto enjoyed a monopoly. Except for a few highly educated and intelligent natives of India, notably Syed Ameer Ali, author of *The Spirit of Islam*, the once powerful Mu'tazilites hardly exist at the present day; while even these 'neo-Mu'tazilites' are rather to be regarded as modern 'broad-church' Muslims

than as the lineal successors of the ancient sect.

The Sunnís, who greatly outnumber the Shí'ites, comprise the four orthodox schools or sects of Abú Ḥanífa (Ḥanifites), Ibn Ḥanbal (Ḥanbalites), ash-Sháfi'í (Sháfi'ites), and Ibn Málik (Málikites), which differ from each other only in comparatively unimportant points of doctrine and practice. Of the Shí'ites, the 'Sect of the Seven' (*Sab'iyya*), or Isma'ílís, has still a few adherents in Syria, and is represented at Zanzibar, and by the Khojas and other cognate sects in India, notably at Bombay (where Aghá Khán, the spiritual head of the Khojas, resides) and in Chitrál. The great bulk of Shí'ites at the present day belong, however, to the 'Sect of the Twelve' (*Ithná 'ashariyya*), which is now the national religion of Persia. In Syria they commonly go by the name of *Metáwila*. At the opposite pole to them stand the *Wahhábís*, those Puritans and reactionaries of Islám who created so great a turmoil in Arabia and the adjoining regions at the end of the last century, and whose denunciations and attacks were especially directed against the adoration of saints, the superstitious veneration of holy places, and tobacco-smoking.

The finest conception of Islám promulgated by the Prophet himself occurs in the second *súra* of the Qur'án, v. 172, and runs as follows:—

'Righteousness is not that ye turn your faces to the East and the West; but righteousness is this. Whosoever believeth in God, and the Last Day, and the Angels, and the Book, and the Prophets; and whoso, for the love of God, giveth of his wealth unto his kindred, and unto orphans, and the poor, and the traveller, and to those who claim an alms, and for the release of the captives; and whoso observeth prayer and giveth in charity; and those who, when they have covenanted, fulfil their covenant; and who are patient in adversity and hardship, and in times of violence:—these are the righteous and they that fear the Lord.'

To appreciate Mohammed's work at its true value, we must remember what he found his people and what he left them. The contrast between the early Muslims and the heathen Arabs is nowhere better brought out than in the reply made by the fugitives at the Abyssinian court to the Nejáshí or sovereign of that country and his bishops and nobles. 'O king!' they said, 'we were a barbarous folk, worshipping idols, eating carrion, leading sinful lives, violating the ties of kinship, evilly entreating our neighbours, the strong among us oppressing the weak; and thus we were until God sent unto us an apostle from among ourselves, whose pedigree we knew, as also his veracity, integrity, and chastity, who summoned us unto God, that we should declare His unity and worship Him, putting away the stones and idols which we and our fathers used to worship in His stead; and who bade us speak truly, faithfully discharge our trusts, observe the ties of kinship, act rightly towards our neighbours, and refrain from forbidden things and from blood; and who forbade us from sinful practices, vain words, consuming the property of orphans, and misusing virtuous women; and who commanded us to worship God, associating none with Him, and to pray, and give alms, and fast.'

Literature. Qur'án: eds. by Flügel (1834, 1837, 1869) and others; trans. into English by Sale (1774 and numerous later editions), with an excellent preliminary discourse, Rodwell (1876), and E. H. Palmer (1880); into French by A. de Biberstein Kazimirski (1854); into German by G. Wahl (1828) and L. Ullmann (1862); Th. Nöldeke, Gesch. d. Qorâns (1860).

Biography of the Prophet: Ibn Hishám (†A.D. 828–9), ed. Wüstenfeld (1859–60), trans. into German by Weil (1864); also monographs by Sir William Muir (4 vols., 1858–61); Th. Nöldeke, Das Leben M.'s nach d. Quellen populär dargestellt (1863); Sprenger, Das Leben u. d. Lehre des M. (1861–5, 1869); R. Bosworth Smith, Mohammed and Mohammedanism, Lectures delivered at the Royal Institution of Great Britain in Feb. and March, 1874 (2nd ed., 1876); Syed Ameer Ali, Spirit of Islam and Life of Muḥammad (2nd ed., 1896).

History of Islam: Sir W. Muir, The Caliphate, its Rise, Decline, and Fall (2nd ed., 1892); G. Weil, Gesch. d. Chalifen (1846–60); Dozy, Het Islamisme (1863 and 1880), with Fr. trans. by Chauvin (1879); Renan, Mahomet et les Origines de l'Islamisme (1864); Hughes, Dict. of Islam (1885, 1896); von Kremer, Culturgesch. d. Orients unter d. Chalifen (1875–7); Gesch. d. herrschenden Ideen des Islams (1868); Culturgeschichtliche Streifzüge auf dem Gebiete des Islams (1873); Goldzieher, Muhammedanische Studien (1889–90); T. W. Arnold, The Preaching of Islam (1896).

Sects of Islam: Shahristání (†A. D. 1153), Kitábu'l-milal wa'n-niḥal (ed. Cureton, 1846),

German trans. by HAARBRÜCKER (1850); Dabistán (a Persian work composed in India about the middle of the 17th century; several Oriental editions), trans. by SHEA and TROYER (1843); GOBINEAU, Religions et Philos. dans l'Asie Centrale (2nd ed., 1866; 3rd ed., 1900). (E.G.B.)

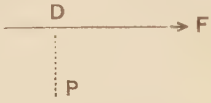
Molecule and **Molecular Force**: see MATTER.

Molinos: see QUIETISM.

Moment: see PRESENT, and TIME PERCEPTION.

Moment [Ger.]: an element or FACTOR (q. v.). It is coming into use in English. (J.M.B.)

Moment (of force) [Lat. *momentum*, movement]: Ger. *Kraftmoment*; Fr. *moment*; Ital. *momento* (*della forza*). The product of the intensity of a force acting along a line DF by the perpendicular DP from that line to some given point P. The amount of the moment therefore depends on the position of P, which



may be any position required by the special problem in hand. Cf. MOMENTUM. (S.N.)

Momentum [Lat.]: Ger. *Moment, Bewegungsmenge*; Fr. *quantité de mouvement*; Ital. *momento*. The product of the mass of a moving body into its velocity.

Moment of momentum. In the case of a particle moving along a line DF (see MOMENT of force) by the perpendicular distance DP from the line to a given point. It differs from the MOMENT (q. v.) of force only in that the momentum of the particle is used instead of the force acting upon it.

In the case of a body or any other system of particles, the sum of the moments of momentum of the different particles. The following is a fundamental property: the moment of momentum is a minimum when for P we take the centre of gravity of the system, and remains constant so long as the system is not acted upon by any force but the mutual action of its own parts. (S.N.)

Monad (**Monadism, Monadology**) [Gr. *μονάς*, unit]: Ger. *Monade*; Fr. *monade*; Ital. *monade*. In ancient philosophy, the unit in arithmetic, or unity as opposed to duality; it figures in this sense in the numerical speculations of the Platonic school and the later Pythagoreans. The special case of the number two, considered as unit or constituent of being, was known to the Pythagoreans as the Dyad (for Zenocrates' doctrine of the Dyad see ONE). (A.S.P.P.–J.M.B.)

(1) With the Pythagoreans, the monad was the number one considered, as well as we can make out, as the first creative deity (Zeller).

(2) In other Greek schools a monad is simply an individual. With the Atomists, an atom.

(3) In the philosophy of Leibnitz a monad is a being pursuing its development according to an inward law, in pre-established harmony with other beings. The idea may be illustrated by two pendulums, each moving according to a formula of its own. This illustration is used by Leibnitz himself. This theory has been resuscitated by Renouvier (*La Nouvelle Monadologie*, Paris, 1898).

(4) In the logic of RELATIVES (q. v.), a proposition with one term left blank, to be filled in if the proposition is to be completed. In chemistry: a radicle with one free bond. (C.S.P.)

In its modern signification the term appears to have been first made current by Giordano Bruno, who uses it, in conscious opposition to the atoms of Democritus, to denote the individual imperishable elementary substances in which the divine essence of the universe manifests itself. Each monad combines form and matter; it is at once spiritual and corporeal. The universe is thus living throughout its minutest parts, and each monad is a microcosm or mirror of the whole. God is called the *Monas monadum*. Bruno's conception of the monads thus combines an intense individualism with a thorough-going pantheism. The analogy of Bruno's conception with the later doctrine of Leibnitz is obvious, and it has been supposed that Leibnitz was indebted to the earlier thinker both for the doctrine and the term. Ludwig Stein, however, who traces very carefully the development of the doctrine of monads in Leibnitz's writings, adduces good grounds for the conclusion that Leibnitz worked out his doctrine of individual substances independently of Bruno, and that the term itself, which he first used in 1696, was suggested to him not by Bruno, but by a contemporary of his own (Van Helmont the younger), with whom he was in correspondence, and who visited him in that year. Had Leibnitz taken his view from Bruno, he would have taken the term at the same time; but the term is used for the first time in 1696, some years after the doctrine had taken definite shape in his mind, and is constantly used thenceforward as the technical term by which he desires to indicate the peculiarity of his own position.

Leibnitz's *Monadology* is the result of his revision of the Cartesian doctrine of substance. Substance, he maintains, is to be conceived as activity or active force; and whereas, according to the abstract definition of substance as the self-existent, it follows that there can be only one substance, room is left, according to the new definition, for an infinite variety of individual substances. These are the monads, not material or extended like the atoms of the physicists and the mechanical philosophers, but 'metaphysical points' or immaterial centres of force, their inward force or life being conceived, after the analogy of mental life, as a grade of 'perception' or ideation, though the grade of mentality may be so low as not to be properly spoken of as conscious. Each monad is entirely self-contained, developing all its experience from within, but each mirrors or 'represents' the universe from its own particular point of view. The system or hierarchy of monads, rising continuously from the lowest to the highest grade of perfection, constitutes the pre-established harmony in which the universe consists. God is represented as the creator of the monads, in so far as he conferred real existence on what pre-existed ideally in the divine thought. At other times, however, God would appear to be, in metaphysical consistency, only an expression for the harmony of self-subsistent monads.

Monadism, in accordance with the foregoing, might be defined as spiritual atomism or spiritual individualism. If the individual substances are supposed to be metaphysically self-subsistent in their isolation, monadism would be a doctrine of ultimate pluralism, at variance with the monistic impulse in which speculation has its rise and by which it is maintained. But a thinker like Lotze, who has his roots in the *Monadology*, conceives the monads or spiritual substances not as absolute or unrelated reals, but as organic members of one world, moments in the life of one Being, which conditions them all and makes reciprocal interaction possible.

The doctrine of MIND-STUFF (q. v.) or the theory that every atom or material fact has its inner side—its atom of sense or consciousness—presents a monadic character; but, in the form originally given to it by Clifford, it dissolves the unity of consciousness into bits or ultimate units of mind-stuff which compound themselves into what we call a mind. It is simply atomism done into terms of mind. (A.S.P.P.)

Literature: EISLER, Wörterb. d. philos. Begriffe, sub verbo; LEIBNITZ, Monadology (Eng. trans., in J. of Specul. Philos., i. (1867) 129, or in ed. by Latta); DUNCAN, Philos. Works of Leibnitz (trans.); LOTZE, Microcosmus, and Hist. of Philos.; L. STEIN, Leibnitz and Spinoza. (J.M.B.)

Monasticism: see ASCETICISM.

Monergism [Gr. *μόνος*, alone, + *ἔργον*, work]: Ger. *Monergismus*; Fr. *monergisme*; Ital. *monergismo*. The doctrine of those Augustinians who deny the co-operation of the human will in the work of regeneration, and hold that it is wholly the work of the Holy Spirit, the human will being passive. See SYNERGISM. (A.T.O.)

Moneron [Lat. *monus*, alone, single]. A name given by Haeckel to the simplest known organisms, including naked Protozoa, such as Amoeba, Protomyxa, and Vampyrella. See E. Haeckel, *Gen. Morphol.* (1866); *Hist. of Creation*. Cf. AMOEBA, and PROTOZOA. (E.S.G.)

Money [OF. *moneie*, Lat. *moneta*]: Ger. *Geld*; Fr. *monnaie, argent*; Ital. *moneta*. A thing which, by common consent of the business community, is used as a basis of commercial obligations.

There are two quite distinct purposes for which supplies of money are needed by the business community and its individual members: (1) as a reserve to secure solvency; (2) as a medium of exchange.

The latter function seems at first sight much more important than the former; so much so, that most writers have made it the basis of the definition of money. It was so in large measure with Smith and Mill; it is much more explicitly so with some modern writers. 'Money is the medium of exchange,' says Walker. 'Whatever performs this function is money.' To this view there are two objections. First, the actual medium of exchange for important transactions is the bank cheque; and Walker himself shrinks from calling this money, though it is a legitimate consequence of his own definition to do so. Second, the thing which a man must have in order to do business is not a convenient medium, but an acceptable reserve. If he has this, he can transfer title in any way he pleases. To lay stress on the means of transfer instead of that which is behind it, opens the way for fallacies both theoretical and practical.

Literature: JEVONS, Money and the Mechanism of Exchange; treatises on political economy and finance. (A.T.H.)

Monism [Gr. *μόνος*, alone]: Ger. *Monismus*; Fr. *monisme*; Ital. *monismo*. Monism is, in

strictness, a name applicable to any system of thought which sees in the universe the manifestation or working of a single principle. Cf. DUALISM, and PLURALISM.

Such a unity may be said to be at once the tacit presupposition and the goal of all philosophic effort, and in so far as a philosophy fails to harmonize the apparently independent and even conflicting facts of experience, as aspects or elements within a larger whole, it must be held to fall short of the necessary ideal of thought. Dualism, in an ultimate metaphysical reference, is a confession of the failure of philosophy to achieve its proper task; and this is the justification of those who consistently use the word as a term of reproach. But the contradictions of experience are so profound, and the difficulties of an ultimate synthesis accordingly so great, that monistic systems are apt to reach their unity by neglecting or overriding fundamental distinctions. Dualism in these circumstances is frequently the reassertion of these distinctions against a monism which the critic considers too 'cheap and easy'; and in the mouth of such critics monism in turn tends to be used in a dyslogistic sense, and to be applied specifically to systems which, by merging the variety of existence in a pantheistic unity, leave no room for individuality or freedom. The doctrine of the Eleatics in ancient, and that of Spinoza in modern, philosophy might be taken as types of such systems. Schopenhauer's pantheism of the will would be a more modern example. Lotze's reference to the 'bold monism' of Hegelian idealism hovers between the two usages of the word, for he expressly recognizes a monistic explanation as the goal of philosophy, while, at the same time, he contends that Hegel's synthesis is overhasty, and does not do justice to all the elements of the problem. Ladd points out (*Introd. to Philos.*, 403) that there are 'two fundamental and irremovable distinctions, the distinction between matter and mind and the distinction between moral good and evil,' the denial or insufficient explanation of which, by speculative systems, provokes, and relatively justifies, the recurrent protest of dualism. But 'we give credence to dualism only in order to be more cautious and penetrating in our philosophical analysis, more patient and comprehensive in our attempt at a final philosophical synthesis. In being consistently and persistently philosophical we are always seeking some form of monistic system.'

The term 'monist' seems to occur first in Wolff, who uses it, in connection with the relation of mind and body, to designate those thinkers who acknowledge only one principle, whether mind or body. It thus includes both idealists and materialists, and is opposed to dualist, dualism being Wolff's own position. After Wolff the term was not much used till it was revived by the Hegelian school in the first half of the present century. Göschel published a book in 1832 called *Der Monismus des reinen Gedankens.* Sir William Hamilton uses it much in the Wolffian sense, in connection with the question of external perception, to include (1) idealists, (2) materialists, and (3) those who maintain that 'mind and matter are only phenomenal manifestations of the same common substance' (*Lects. on Met.*, i. 296). The term thus includes with him all philosophers except those whom he designates natural dualists (e. g. Reid) and hypothetical dualists (e. g. Descartes and Locke and the 'great majority of modern philosophers'). Hamilton's classification, however, is made with too exclusive reference to a single epistemological problem, instead of being undertaken from an ultimate metaphysical point of view.

In recent discussion the term has come into popular use in connection with the psychophysical question of the relation of MIND AND BODY (q. v.). It is used by a number of writers to denote what is otherwise known as the double-aspect theory or the theory of parallelism. According to this view, 'we have no right to take mind and body as two beings or substances in reciprocal interaction. We are, on the contrary, impelled to conceive the material interaction between the elements comprising the brain and the nervous system as an outer form of the inner ideal unity of consciousness. It is as though the same thing were said in two languages' (Höffding, *Outline of Psychol.*, chap. ii). As this doctrine obviously reproduces the Spinozistic theory of parallelism between the attributes of thought and extension, it is sometimes spoken of as Neo-Spinozism. It sometimes claims merely to state an empirical concomitance, and to rank therefore as a scientific law, without involving a decision on the metaphysical question of the ultimate ground of existence. But in general the theory is not limited to the case of 'minds,' or even of living things, but is made coextensive with existence, each particle of matter being supposed to possess a mental aspect. It passes, therefore, into a metaphysical theory which represents the world of consciousness

and the world of matter as parallel manifestations of one underlying substance. Philosophically, such a theory must be regarded as imperfect, in so far as it offers no explanation of the duality which it empirically accepts, and throws no light on the nature of the identical substance which it speculatively asserts. In any case, this application of the term monism is an unwarrantable limitation of the term to a single form or variety of monism regarded as a philosophical theory. It is sometimes known as 'scientific monism.'

. *Literature*: works on metaphysics generally, and BIBLIOG. B, 2, *f*. In relation to the last-mentioned use of the term cf. HÖFFDING, as cited above; LLOYD MORGAN, Compar. Psychol., Prolegomena and chap. ii; ROMANES, Mind, Matter, and Monism; CARUS, numerous papers in the Monist, i. ff.; E. HAECKEL, Natürliche Schöpfungsgesch.; Monismus als Band zwischen Wiss. u. Religion (1895, Eng. trans.); and Riddle of the Universe (Eng. trans., 1900); E. MORSELLI, La Filos. monistica in Italia, Riv. di Filos. scient. (1886); and GIORDANO BRUNO, Commem. Address, Rome, 1887 (1888). (A.S.P.P.)

Monitorial System [Lat. *monitor*, from *monere*, to advise]: see BELL AND LANCASTER.

Mono- [Gr. μόνος, single, only]: Ger. *Mono-*; Fr. *mono-*; Ital. *mono-*. (1) In one respect: as MONOMANIA (q.v.; also termed, by Clouston, monopsychosis). (2) Affecting one part or member of the body: as monoplegia, paralysis of one limb; monocular, relating to one eye; monologue, repetition of one sound (Lall-Monologe, Preyer: see LALLING). (J.J.)

Monogony: see AGAMOGENESIS.

Monoideism [Gr. μόνος, alone, single, + ἰδέα, idea]: Ger. *Monoïdeismus*; Fr. *monoidéisme*; Ital. *monoideismo*. A state of mind in which the attention is fixed for a somewhat extended period upon a single idea, with a certain artificial concentration known variously as 'paralysis,' 'rigidity,' 'spasm,' 'static contraction,' &c., of the attention. It occurs in cases of pathological FIXED IDEAS (q.v.), HYPNOSIS (q.v.), and what is variously called 'charming,' effect of 'evil eye,' &c.

This is in opposition to the usage (Ribot) which applies monoideism to normal attention, in which the ready and facile movement of attention over a field, and transition from one object to another, is in sharp contrast to the fixity noted here. (J.M.B.–G.F.S.)

Monologue: see MONO-, and LALLING.

Monomania [Gr. μόνος, single, + μανία, madness; according to Esquirol, derived from μήνη, moon, maniac being the Greek form for the Latin form 'lunatic']: Ger. *Monomanie*; Fr. *monomanie*; Ital. *monomania*. Introduced by Esquirol for partial insanity and melancholia (in its original sense), in distinction from the more diffuse disorders—mania, dementia, and imbecility. Prichard introduced it in English (cf. MORAL INSANITY).

The existence of such limited disorders cannot be questioned; but they appear under so many distinct conditions that it is more customary and better to sacrifice the merely descriptive term monomania for one which suggests the actual clinical process involved. Indeed, the term is at present mainly of historical interest, and reflects an uncritical attitude which classifies symptoms on superficial resemblance instead of on ground of their origin, development, and correlation (cf. PSYCHOSES). Even for those psychoses in which the symptom-complex remains throughout that of partial delusional insanity, most writers have abandoned the term monomania in favour of PARANOIA (q.v.). The word mania is no longer used for delusional states or delusions in psychiatry; and even if it were, there are too many cases of this type in which more than one 'mania' exists (e.g. delusions of grandeur and delusions of persecution). Moreover, it seems dogmatic to merely call the delusions themselves abnormal, and not to acknowledge the weakness of the 'normal part' of the reasoning, which fails to counteract the formation of the delusions. Prichard himself admits that on careful inquiry it will often be found that the mind is in many respects in a different condition from that of perfect health.

The forms which Esquirol classified under this term are now divided as follows:—

(1) PARANOIA (q.v.) and paranoic conditions. (2) Residuals from processes of deterioration: chronic delusional conditions representing the result of katatonia and dementia praecox. See PARANOIA (secondary). Esquirol's cases of 'erotomania' are paranoic forms of dementia praecox. (3) Epidemic hysteria of religious character. (4) Manic-depressive insanity (several of Esquirol's instances of monomanie raisonnante are cases of recurrent hypomania). (5) Constitutional neurasthenia or psychopathic inferiority (phobias, tics, impulses, &c.). Prichard also includes melancholia, hypochondriasis, and paranoia with somatic delusions, &c. Cf. the topics cited.

Literature: ESQUIROL, Des Maladies mentales, ii. 1 ff. (1839); PRICHARD, Treat. on

Insan., 26ff. (1835); SPITZKA, Insanity (1883); BALLET-MORSELLI, Psicosi (1896). (A.M.)

Monophysites [Gr. *μόνος*, single, + *φύσις*, nature]: Ger. *Monophysiten*; Fr. *monophysites*; Ital. *monofisiti*. A sect of Eastern Christians taking its rise in the 5th century, who, while admitting the union of the two natures in the incarnation of Jesus, yet maintain that his nature is essentially simple, the human element being virtually absorbed into the divine.

This doctrine gave rise to an important controversy, which involved both the political and ecclesiastical relations between Rome and Constantinople. The doctrine was finally declared heretical, and Severus, its principal exponent, condemned. The doctrine survived, however, being especially strong in Egypt. The Armenian Church of the present is nominally of the Monophysite belief.

Literature: DORNER, Christliche Glaubenslehre, ii (1880, also Eng. trans.). (A.T.O.)

Monopoly [Gr. *μόνος*, exclusive, + *πωλεῖν*, to barter]: Ger. *Monopol*; Fr. *monopole*; Ital. *monopolio*. (1) An exclusive trade privilege. (2) The control, in whatever way obtained, of all the sources of supply of any commodity in a particular market. (3) The control of a specially good source of supply.

The advantage under (3) is more properly called a differential gain than a monopoly.

The most common instances of (1) are patents and copyrights. They are granted not so much because of any theory of property in ideas, as on account of the fact that few people can develop a new process or issue a new book unless assured of some valuable gain in case of success to counterbalance the large loss in case of failure.

Monopolies of form (2) arise chiefly in this way: when the most economical supply of the market requires a mass of concentrated capital, there may not be an aggregate demand sufficient to support more than one such concern at any price; and even where things have not reached this extreme, there will often be so few concerns as to render continuation easy and the advent of a new competitor slow and difficult. Railroads and waterworks often furnish an example of the former class; manufacturing TRUSTS (q.v.) of the latter. (A.T.H.)

Monosyllogism: see SYLLOGISM.

Monotheism [Gr. *μόνος*, alone, + *Θεός*, God]: Ger. *Monotheismus*; Fr. *monothéisme*; Ital. *monoteismo*. (1) In religion: the belief in one God.

This term is more in use in the history of religion than in philosophy, and is used chiefly in contrast to polytheism. Hence Xenophanes is frequently spoken of as a monotheist on account of his polemic against the polytheism of the popular faith of Greece: 'One God there is, greatest among gods and men, neither in form nor in thought like unto men.' So also Judaism is characterized as a monotheistic religion in contrast with the polytheistic nature-worship of the surrounding peoples, and the same epithet has been applied in later times to Mohammedanism. Monotheism, as a reaction from nature-worship, involves the conception of God as a spiritual being distinct from nature, which is regarded as his creation. This distinction of the Creator from his creation tends, in the typical monotheistic religions mentioned, to pass into an abstract separation, which reduces God to an externally active Cause and Lawgiver. Hence monotheism is treated by some writers as a defective doctrine—a stage on the way to a philosophical theism (see 2, below). Thus, for example, Edward Caird, in his *Evolution of Religion* (ii. 67), says, speaking of the relation of Judaism to Christianity: 'Nothing could meet the want of the time but a religion which should unite the immanence of pantheism with the transcendence of monotheism.' Historically, there are two conflicting theories of the order of religious development; the one regarding polytheism as the corruption of a purer form of monotheistic belief; the other representing monotheism as an evolution from pre-existing polytheism. (A.S.P.P.–A.T.O.)

(2) In philosophy: the doctrine that God is one indivisible being and the embodiment of the unitary principle of reality.

Monotheism, in philosophy, is a genus of which THEISM and PANTHEISM are species (see those terms). It is to be distinguished from henotheism, the doctrine of a supreme being in a hierarchy of deities. Monotheism may stop short of the assertion of the personality of God, as in pantheism. Its one distinctive feature is its dogma of the unity of the divine nature.

Literature: see the topics named, especially THEISM, and BIBLIOG. E, 2, *e*. Also ZELLER, Development of Monotheism among the Greeks; S. B. GOULD, Hist. of Monotheism; E. CAIRD, Evolution of Religion. See also under THEISM. (A.T.O.)

Monothelitism [Gr. *μόνος*, alone, + *θέλειν*, to will]: Ger. *Monothelitismus*; Fr. *monothélitisme, monothélisme*; Ital. *monotelitismo*. A

modified form of the Monophysite doctrine to the effect that the dual nature of Jesus Christ possessed but one energizing will.

This doctrine, brought forward as a compromise between Monophysite and orthodox parties, gave rise to a temporary truce, but was finally condemned as a heresy in 680–1, after which it disappeared.

Literature: SCHAFF, Christ and Christianity, 62; DORNER, Doctrine of the Person of Christ, ii. Pt. I; WATSON, Ketzerhistorie, IX. iii. 666; MÖLLER, in Herzog's Real-Encyc. (A.T.O.)

Monotypic and **Polytypic Evolution**: see EVOLUTION (in biology), and cf. PHYSIOLOGICAL SELECTION.

Monster [Lat. *monstrum*, a prodigy, a wonder]: Ger. *Missgeburt, Monstrum*; Fr. *monstre*; Ital. *mostro*. An organism congenitally much malformed. Cf. SPORT.

No definite line can be established between malformation and monstrosity, as the difference is one of degree only. When the malformation is so great that the appearance of the individual organism differs widely from the normal, the term monster is applied. These abnormal forms are not infrequently developed in the human species during the period of gestation. Such abnormal forms follow more or less certain types, and have therefore been classified. The study of monstrosities is called TERATOLOGY (q. v.).

While ordinarily used in regard to anatomical malformations, it is also employed in a psychological sense, especially in reference to absence or perversion of the moral and emotional sensibilities. (C.S.M.–J.J.)

Literature: IS. G. ST.-HILAIRE, Hist. des Anomalies (1832); C. DARESTE, Production des Monstruosités (1891); L. GUINARD, Tératologie (1893); T. H. MORGAN, The Frog's Egg (1897); W. ROUX, Gesammelte Abhandl. ü. Entwickelungsmech. d. Organismen (1895); TARUFFI, Storia della Teratologia (1895). (E.S.G.)

Montaigne, Michel Eyquem, Seigneur de. (1533–92.) Born at Périgord, France, and educated at Bordeaux, he studied law at fifteen, and in 1554 became a counsellor in the Parliament of Bordeaux, where his friendship for Étienne de la Boétie began. Resigned in 1570 and devoted himself to literature. In 1580 he travelled in Germany, Switzerland, Italy, and the north of France. In 1581 became mayor of Bordeaux. Fled from the city, 1585, to escape the plague.

Montanism: Ger. *Montanismus*; Fr. *Montanisme*; Ital. *Montanismo*. The doctrine of a sect of Christians, in the second century, founded by Montanus, which combined belief in the continuance of the miraculous gifts of the Apostles and in the personal inspiration of Montanus, with the expectation of the second coming of Christ in the near future and the practice of a rigorous ascetic discipline.

The significance of Montanism lies almost exclusively in its claim of a continuance of miraculous gifts in the Church. This was, on the one hand, an anticipation of the ecclesiastical doctrine of infallibility, and on the other, the first assertion of the principle of the progressive revelation of Christian truth. Newman takes this view, while Ritschl, in Harnack's words, regards it 'as a reaction against secularism in the Church and an effort to conserve the principles of primitive Christianity.'

Literature: J. H. NEWMAN, Essay on Devel. of Christ. Doctrine (1845); BONWETSCH, Gesch. d. Montanismus (1881); A. HARNACK, Encyc. Brit. (9th ed.), art. Montanism; MCCLINTOCK and STRONG, Cyclopedia, art. Montanism. (A.T.O.)

Montesquieu, Charles Louis de Secondat, Baron de. (1689–1755.) Educated in the Oratorian college of Juilly and (in law) at Bordeaux. Became counsellor in the Parliament of Bordeaux, 1714, and president, 1716. Chosen to the Academy, 1728. Travelled in Germany, Austria, and Italy, spending two years in England, studying methods of government. Returned to France, 1731, and devoted himself to historical study.

Mood [Lat. *modus*]: Ger. *Stimmung*; Fr. *humeur*; Ital. *umore*. Pronounced emotional tone not connected with particular mental objects, and having much colouring from organic sensations.

Literature: STOUT, Manual of Psychol., 286 f.; the titles given under EMOTION, and in BIBLIOG. G, 2, *k*. (J.M.B., G.F.S.)

Mood (in grammar): see CONJUGATION (linguistic), and INFLECTION.

Mood (in logic) [Lat. *modus syllogistici*, trans. of Aristotle's *τρόπος συλλογισμοῦ*]: Ger. *Schlussmodus*; Fr. *mode*; Ital. *modo*. Kind of SYLLOGISM (q. v.), varying with the quantity and quality of the premises and conclusions.

In each syllogistic FIGURE (q. v.) sixteen combinations are possible of the propositions A, E, I, O. Only certain of these are recognized as valid, to which names are given as cited under MNEMONIC VERSES AND WORDS (q. v., 8). For the 'rules' for testing the validity of the various modes see SYLLO-

GISM. Historical citations on the topic may be seen in Eisler, *Wörterb. d. philos. Begriffe*, 'Schlussmodi.' (J.M.B., C.L.F.)

Moral and **Morals:** see ETHICS, and ETHICAL THEORIES. Cf. MORAL SCIENCES.

Moral Argument (for the existence of God): see THEISM.

Moral Courage: see COURAGE.

Moral Faculty: Ger. *moralische Fähigkeit*; Fr. *faculté morale*; Ital. *facoltà morale.* The mental capacity or 'power' in the individual by which is apprehended the moral quality of actions or the distinction between right and wrong.

The term is used by Butler as a general term which implies no special view of the nature of the power of distinguishing between right and wrong. 'That we have this moral approving and disapproving faculty is,' he says, 'certain, from our experiencing it in ourselves and recognizing it in each other.' Its existence is presupposed, 'whether called conscience, moral reason, moral sense, or divine reason, whether considered as a sentiment of the understanding or as a perception of the heart, or, which seems the truth, as including both' (*Diss. on Virtue*, apud init.). The term, which was frequently employed by the English moralists and Scottish philosophers, has for the most part fallen out of use with the decay of the 'faculty psychology.' Cf. CONSCIENCE, MORAL SENSE, and PRACTICAL REASON. (W.R.S.)

Moral Insanity: Ger. *moralischer Irrsinn*; Fr. *folie morale*; Ital. *pazzia morale.* 'A morbid perversion of the natural feelings, affections, inclinations, temper, habits, moral dispositions, and natural impulses, without any remarkable disorder or defect of the intellect or knowing and reasoning faculties, and particularly without any insane illusions or hallucinations' (Prichard, 1835).

The word moral was used not in the sense of ethical, but as a contrast to 'delusional' or 'incoherent,' referring to Locke's remark: 'Madmen do not appear to have lost the faculty of reasoning; but having joined together some ideas very wrongly, they mistake them for truths, and they err, as men do that argue right from wrong principles.' The cases which Prichard alludes to are mostly mild forms of manic-depressive insanity (see MANIA), of which he describes very plainly the ups and downs of exaltation and depression with absence of any delusion or immorality. Other cases have merely 'a liability to violent fits of anger breaking out without cause and leading to the danger or actual commission of serious injury to surroundings, persons,' or criminal impulses (irresistible impulse to break things, to put fire to buildings, to commit every kind of mischief, to steal), or nostalgia, erotomania, satyriasis, and nymphomania (unusual intensity of sexual passion). Prichard also includes epileptic irascibility and finally the senile insanity in which 'the pious become impious, the constant and happy discontented and miserable, the prudent and economical imprudent and ridiculously profuse, the liberal penurious, the sober drunken.' Further, he mentions eccentric wayward and antisocial individuals in whom heredity of mental diseases, and even previous attacks of insanity and profound change of character, are demonstrable.

The term 'moral insanity' is now commonly replaced by the terms respectively which characterize the actual psychosis of which it forms a manifestation. As illustrated above, it occurs symptomatically in hypomania (see MANIA), in the restless and adventurous period of certain types of general paralysis or senile dementia, with prominent deterioration of character, in licentiousness and sexual crimes, stealing, &c., or in alcoholic deterioration; and in paranoia (acts of persecution for supposed wrong or of inspiration, as in the well-known case of Guiteau, the murderer of President Garfield) or in epilepsy (impulsive violence, stealing, &c.). There are, further, some cases which are now commonly thought of as real instances of 'moral insanity,' in which, notwithstanding normal educational opportunities, a peculiar deficiency of appreciation of moral values lasts beyond childhood, or crops out at the period of puberty, when a larger scope of individual and social responsibilities may normally be expected to arise. These cases belong to the category of constitutional psychic inferiority, and are properly classed as moral imbecility, whether they are combined with or occur in the absence of intellectual, emotional, and impulsive deficiency. In these cases there is an inability of adaptation to the demands and existing order of society, a predominance of vicious, antisocial, and even criminal instincts, resulting in discomfort and injury to those immediately affected and to society at large. Various forms of the defect occur: there may be a complete lack of appreciation of right and wrong, or a general appreciation of the difference without any desire to act accordingly, or a desire to act differently, but

no sufficient power of will to convert motive into action, i.e. a sort of moral abulia. Sexual immorality, prostitution, alcoholism, disregard of family and other duties, a fiendish passion for making trouble, stealing and forging and lying (Delbrück's pseudologia phantastica) are the most frequent types of action expressive of moral insanity.

A special reason for the survival of the term is its antagonism to certain concepts of English law which ignore completely the undeniable fact that there are states of merely diminished responsibility. This law recognizes irresponsibility only where the perpetrator is unable to distinguish between right and wrong in the act committed; while undoubtedly there are states where the criminal recognizes this distinction but is practically unable to choose between right and wrong, owing to the psychopathic conditions mentioned above.

Literature: see the topics mentioned; also DELBRÜCK, Die pathologische Lüge und die psychisch abnormen Schwindler (1891); BLEULER, Über moralische Idiotie, Vtljsch. f. gerichtl. Med. (1893); KAHLBAUM, Über Heboïdophrenie, Allg. Zeitsch. f. Psychiat., xlvi. 461–74; ERDMANN MÜLLER, Arch. f. Psychiat., xxxi. 325–77; J. C. PRICHARD, A Treatise on Insanity (1835); HACK TUKE, art. Moral Insanity, in Tuke's Dict. of Psychol. Med., with literature. (A.M.)

Moral Judgment: Ger. *sittliches Urtheil*; Fr. *jugement moral*; Ital. *giudizio morale*. (1) The judgment passed upon the ethical quality of conduct or character. See CONSCIENCE. (W.R.S.)

(2) Judgments of value, WORTH (q.v.), or appreciation, distinguished from intellectual judgments, or judgments of relation, predication, assertion. Cf. JUDGMENT.

Intellectual judgments reflect what is true or consistent, moral judgments what is fit with reference to some sort of standard or ideal which may not be realized at all. Even on the theory that moral judgments are not absolute but relative, there is still a distribution of values, of which the given worth is one, with reference to a scale; and this in turn implies an ideal of excellence. The common element which perhaps justifies the use of the term moral judgment is the subjective attitude of assent or endorsement which it shares with cognitive judgment. It would be better to give up the use of the term moral in application to all sorts of worth (in such expressions as 'moral sciences,' and in the French 'fortune morale'), and to restrict it to the ethical, as in the definition (1). The word PRACTICAL (q.v.) is being more and more used in this general sense, and that term is available. See also PRACTICAL REASON, and PRACTICAL JUDGMENT.

Literature: ORMOND, Foundations of Knowledge, Pt. III. chap. iii; and citations under WORTH. (J.M.B.)

Moral Order: see ORDER (moral).

Moral Philosophy (and **Science**): see ETHICS, and ETHICAL THEORIES.

Moral Progress [Lat. *progressus*]: Ger. *sittlicher Fortschritt*; Fr. *progrès moral*; Ital. *progresso morale*. Advance towards perfection, or the process of the realization of the moral ideal.

Moral progress is a characteristic idea of Christian thought, both as regards the individual and society. The moral ideal being conceived as infinite, the moral life is apt to be regarded as a *progressus in infinitum*. Thus Kant deduces from the infinity of the moral task the immortality of the moral being. Of the evolution moralists, some identify progress with evolution, and hold that the progress of society and that of the individual proceed *pari passu*, their common goal being the complete adaptation of the individual to his environment. Others find in social organization a reflection of the ethical progress made by the individual, at the same time that the individual's ethical nature has arisen for the fulfilment of social utilities. According to Mill, Spencer, and Stephen, the chief factor in moral progress is sympathy; according to Alexander, progress is the result of a struggle of ideals, in which the best or fittest survive. According to Leslie Stephen, the direction of progress is from conduct to character, from the form 'Do this' to the form 'Be this.' On the other hand, the fact of moral progress, and especially the identity of progress and evolution, has been denied. Cf. Huxley's *Romanes Lecture*, 'Evolution and Ethics' (discussed by Royce, Baldwin, and others in *Int. J. of Ethics*, 1895), and A. J. Balfour's 'Fragment on Progress,' in *Essays and Addresses*, 241 ff. The pessimists hold that the course of things is from bad to worse, a regress rather than a progress. Cf. SOCIAL PROGRESS.

Literature: many works on ethics, especially by the writers named, as cited under ETHICS, and ETHICAL THEORIES; see also BIBLIOG. F, 2, *f*, *n*. (J.S.)

Moral Science: see ETHICS.

Moral Sciences: Ger. *Geisteswissen-*

schaften; Fr. *sciences morales*; Ital. *scienze morali*. Those branches of inquiry which deal with mind and conduct, as opposed to matter and life; i. e. they are contrasted with the physical and natural sciences (see SCIENCE), and are often described as the 'mental and moral sciences.'

In this general division all knowledge of man, apart from his body and its history, falls to the moral sciences; history, political economy, law, and statistics, as well as psychology, anthropology, and ethics. The psychological factors involved, such as desire, emotion, effort, and the pursuit of ideals, stand in the way of the treatment of the phenomena by the formulas of quantitative measurement. The French cover the distinction by their phrase 'la FORTUNE PHYSIQUE (q.v.) et la fortune morale.' (J.M.B.)

Moral Sense: Ger. *sittliches Gefühl*; Fr. *sens moral*; Ital. *senso morale*. The specific feeling—or faculty of feeling—attaching to the distinction between right and wrong.

The term moral sense is described by Adam Smith (*Moral Sentiments*) as 'a word of late formation and not yet English.' The term 'moral sense writers' is now commonly used to denote a succession of English moralists, of whom Shaftesbury and Hutcheson were the chief. The term moral sense is used by Shaftesbury (in the margin of his *Inquiry concerning Virtue*) as synonymous with 'sense of right and wrong,' and as indicating a feeling in the individual which accompanies right or wrong action or disposition. It is spoken of as a 'reflex affection,' because the 'objects of the affection' are 'the very actions themselves, and the affections of pity, kindness, gratitude, and their contraries, which are brought into the mind by reflection.' 'So that, by means of this reflected sense, there arises another kind of affection towards those very affections themselves, which have been already felt, and are now become the subject of a new liking or dislike' (*Inquiry*, Bk. I. Pt. I. § 3). The doctrine of a moral sense was, however, most fully elaborated by F. Hutcheson in three works—*Inquiry into the Original of our Ideas of Beauty and Virtue* (1725), *Essay on the Nature and Conduct of the Passions and Affections with Illustrations on the Moral Sense* (1728), and *System of Moral Philosophy* (published posthumously in 1755). The moral sense is described by him as a 'determination of our minds to receive amiable or disagreeable ideas of objects.' 'By a superior sense, which I call a moral one, we perceive pleasure in the contemplation of such [*sc.* good] actions in others, and are determined to love the agent (and much more do we perceive pleasure in being conscious of having done such actions ourselves) without any view of further natural advantage from them' (*Inq.*, 106, 124). It is described as a 'taste or relish' (*Syst.*, i. 59); and its 'gratifications are constituted by nature our most endurable pleasures' (*Essay*, xix). In Hutcheson's latest work the reflex nature of the moral sense is most distinctly brought out, and it is said to have reference to 'affections' or dispositions, rather than to actions (i. 97). Adam Smith replaces this view of a distinct moral sense by his doctrine of sympathy (*Mor. Sent.*, VII. iii. 3). (W.R.S.)

Moral Statistics: Ger. *moralische Statistik*; Fr. *statistique morale*; Ital. *statistica morale*. A branch of practical STATISTICS (q.v.). An examination of the French criminal statistics by the statistician Guerry in the year 1829 showed that the conduct of the population from a moral point of view might be made a subject of statistical investigation. Hence arose moral statistics.

The development of statistical inquiry among civilized communities within the present century has led to a corresponding expansion of the field of moral statistics. In addition to criminal statistics, moral statistics now include the statistics of suicide, of illegitimacy, of divorce, and in fact of any manifestation of human conduct in its moral aspects which admits of enumeration and effective comparison. Moral statistics draw material from almost every department of practical statistics. The birth-rate belongs to the statistics of population, but it is also of great value to the moral statistician. It not merely supplies him with the number and ratio of births which take place outside bonds of wedlock; it also assists him to discover how far the natural increase of the community is checked among the married population by artificial means. Ecclesiastical statistics may also be utilized by the moral statistician. The growth or decay of ecclesiastical or secular marriages is in its way a symptom of the moral condition of the community. Trade statistics, where they are concerned with the consumption of alcoholic drinks or with the statistics of luxuries, are to a certain extent an index of the moral standard of the people. Educational statistics and the statistics of pauperism have a close relation to moral statistics. Conduct depends

on vital, intellectual, economic, religious, and political conditions, and the statistical materials which these conditions supply are all of value to the moral statistician.

Moral statistics admit of almost as much subdivision as society itself, and the subdivisions run upon somewhat similar lines. Morality is a characteristic of the human race. Hence moral statistics are international in character, and the first subdivision of moral statistics may be appropriately described as international moral statistics. The results of international moral statistics, in so far as it is possible to get results, are arrived at by the method of comparison. All civilized communities collect statistical material which enables them to give the ratio of crime, suicide, illegitimacy, divorce, &c., occurring in such communities within a strictly defined period of time. The task of international moral statistics is to collect these ratios and to present them in a comparative form. When this has been done, we see the rate of crime, the rate of suicide, the rate of illegitimacy, and so on, which exist in the civilized world at a given time, and the difference between one nation and another with respect to these ratios. Let us take the international statistics of homicide as an example.

Homicides per million inhabitants.

Italy, 1880–4	96
France, 1880–4	15
Germany, 1882–4	10
Spain, 1883–4	76
Austria, 1877–81	24
England, 1880–4	5
Ireland, 1880–4	10
Scotland, 1880–4	5

This table, which is extracted from Professor Ferri's *L'Omicidio*, sheds considerable light on the international distribution of homicide. It is not, however, to be taken as an absolutely accurate representation of the facts. Penal law, penal procedure, the definitions of crime, differ in different communities. These differences affect the statistical returns, and all that we get as a result of international statistical comparisons is an approximation to the facts. But approximations, although falling short of complete accuracy, are often of great value. They lead the student of moral statistics to inquire into the various conditions which tend to produce a high or a low rate of homicide or suicide, or whatever the subject under consideration may be. The conditions, for instance, which make homicide vary so much in different countries may be partly climatic, partly racial, partly social, partly economic. International statistics, although they are too incomplete to be taken as a test of the position occupied by nations in the scale of morality, are, nevertheless, an invaluable means of awakening communities to the moral evils which exist within them; and when such statistics afford a clue to the conditions which produce these evils, they may help to pave the way for removing them.

National moral statistics embrace a narrower area, but are more accurate in character than international statistics. In national statistics the accuracy of the returns is not disturbed to the same extent by differences of method in the collection and arrangement of the statistical material. Practically the same method of collection and arrangement may exist for a considerable period of time. When this is the case, a comparison of the moral conditions of one period with the moral conditions of another attains a considerable degree of accuracy. This is exemplified, for instance, in the statistics of illegitimacy in England and Wales during the last quarter of a century. During that period there has been little or no change in the method of collecting the statistical data relating to the general birth-rate. In the quinquennial period 1876–80 the rate of illegitimate births to the total number of births was 47 per 1,000. In the quinquennial period 1893–7 the illegitimate birth-rate had sunk to 42 per 1,000. It may be fairly assumed from these returns that the vice of illegitimacy is diminishing in English social life. But it would be hazardous to argue from this fact that there has been a corresponding improvement in sexual morality as a whole. It is possible that this may be the case, but the decrease in the proportions of illegitimacy is not in itself a conclusive proof of it. In England the tendency of the population for a long period has been to concentrate in large cities. Prostitution is almost entirely a product of city life. The effect of prostitution is to diminish the proportions of illegitimacy. In London, for instance, the rate of illegitimacy is lower than it is in the population as a whole. But it would be rash to infer from this fact that the morality of the sexes is on a higher level in the metropolis than in other portions of the kingdom where illegitimacy is more prevalent. While illegitimacy is comparatively low in large English cities and comparatively high in the country districts, the reverse

is the case in France and also in Germany. M. Levasseur, in his remarkable demographic work *La Population française*, gives the following table exhibiting the proportions of illegitimacy in urban and rural France :—

Illegitimate births per 1,000 *in* 1879–83.

Department of the Seine . . .	24
Urban population of France . .	101
Rural population of France . . .	42
Average for France as a whole . .	74

Notwithstanding the fact that prostitution tends to diminish illegitimacy, we find that it is urban and not rural France which has the highest proportion of illegitimate births. This leads the moral statistician to the conclusion that prostitution is only one of the conditions affecting the movement of illegitimacy. As far as France is concerned, M. Levasseur says that the other conditions are the growth of large cities, the development of industrialism, the obligation of military service, the weakening of the religious sentiment, an indisposition to accept the burdens of family life, the temptations of luxury for poor girls, and the prescriptions of the French law, which forbids 'la recherche de la paternité.' In addition to these causes the high rate of illegitimacy in many French and German cities is to be attributed to the growth of certain political and social ideals among the masses of the population. In certain anarchist and socialist circles the ideal of normal sexual relationship is regarded not as a legal but as a purely voluntary union. Where this ideal is practised, the offspring of such relationships are illegitimate in the eye of the law; and if this ideal is practised to any considerable extent, it at once heightens the proportions of illegitimacy. In such cases a high ratio of illegitimacy does not necessarily presuppose a correspondingly low level of sexual morality. It will also be observed, in connection with the statistics of illegitimacy in France and England, that international moral statistics sometimes assist us to interpret the meaning of national statistics, and to widen our grasp of the conditions which contribute to produce the statistical results.

In national moral statistics the difficulty of arriving at accurate results arises from the fact that we cannot compare contemporaneous periods as in international statistics, but must compare different periods, as, for example, the present with the past, or one period in the past with another period in the past. Even where the collection and arrangement of the statistical material remains the same, the material itself is often considerably affected by changes in the law, or changes in the administration of the law, or by a combination of both. It is the operation of these circumstances which makes it so difficult to estimate exactly the national movement of crime over lengthened periods. Criminal law in the course of a generation undergoes considerable change. Old enactments are repealed or modified in their operation. New enactments are made. The development of legislation is constantly adding new crimes to the statute book, and to a limited extent removing old ones. In England the coming into force of the compulsory Education Act, which compelled every parent under a penalty to send his child to school, at once added enormously to the number of persons tried and convicted before the criminal courts. The growth of industrial legislation has worked in the same direction. Employers' liability Acts, factory and workshop Acts, mines and quarries Acts, merchant shipping Acts, are all Acts with penalties attached to them, and all of them have tended to add to the ratio of persons coming before the criminal courts. These facts must all be borne in mind and due allowance made for them when comparisons are made between two periods where the legal conditions differ under which the population live. If the moral statistician looks merely at the criminal returns relating to the total volume of offences for trial before the criminal courts, he will see that these offences are increasing; and if he does not look outside these returns, he will be led to the conclusion that crime, in its widest sense, is increasing, and that the morality of the population is deteriorating. If, on the other hand, the moral statistician looks merely at the growth of social legislation, if he counts up the number of education Acts, of industrial Acts, of municipal Acts passed into law in order to improve the intellectual and physical condition of the population, he will come to the conclusion that the moral sense of the community is developing, otherwise such Acts would not have come into existence. Both views would be one-sided, because neither view takes account of all the statistical material at hand for forming a comprehensive judgment. On the one hand, the statistics of social legislation show the growth of the sentiment of social duty; the statistics of the growth of offences, on the other hand, show the moral danger of bringing larger and larger sections of the

population under the lash of the criminal law. The ultimate problem in this case would be whether the danger is greater than the benefit, or the benefit than the danger.

The examples which have just been given show to what extent national moral statistics are affected by changes in legislation when these statistics cover a considerable period of time. They are similarly affected by changes in the administration of the law. If a law is very rigidly administered, if all offences under it, however trivial in character, are prosecuted without exception, the annual return of trials and convictions for such offences will be at a maximum. If, on the other hand, the law is administered with forbearance and consideration, the annual return of offences will not be nearly so high. And yet in both cases exactly the same number of offences may have been committed. One of the principal reasons why the juvenile population in English prisons has diminished so much in recent years, is that magistrates and judges are now exercising greater patience and forbearance with the juvenile offender. Instead of sending him to prison, they are cautioning him, or fining him, or committing him to an industrial school. In the same way the adult prison population in England has been greatly diminished by resorting on a larger scale to the penalty of fining rather than the penalty of imprisonment, and by the growing practice of passing shorter sentences on offenders committed to prison. All these circumstances have to be taken into consideration when we begin to interpret the contents of national moral statistics. The statistics themselves are little more than the raw material. They are meaningless and misleading until we have made a study of all the circumstances connected with them and affecting them. Comparisons between one period and another of the moral statistics relating to the national life must never be undertaken till a preliminary study has been made of all the conditions bearing upon the returns. It is the neglect of this elementary precaution which has done so much to bring statistical methods, when applied to social phenomena, into contempt.

A third subdivision of moral statistics is the moral statistics of the various localities, whether they are provinces, states, or counties, of which a nation is composed. The local or, as it is often called, the geographical distribution of divorce, suicide, crime, &c., is very uneven. In some parts of the country the ratio is above the average for the whole population; in other districts it is below the average. It is the business of moral statistics to attempt to account for the conditions which produce these differences. In France, for instance, the rate of suicide is highest in the departments around the capital, and lowest in the extreme west and in the departments along the southern frontier. In the United States, homicide is highest in the south and west, and lowest in the east and north. In England, illegitimacy reaches its lowest in such counties as Middlesex and Essex, and its highest in Cumberland and Hereford. In the case of local moral statistics, all the statistical material is collected and arranged in the same manner in European communities, and thus lends itself to exact comparisons between district and district. In the United States this is not the case. Before interstate statistics can be compared, differences in legislation and in administration must be taken into consideration. But in local statistics, where law, administration, and the arrangement of the statistical material are identical, the problem before the moral statistician is considerably simplified, and his results are much more assured.

The moral statistics of classes, trades, and professions form another subdivision of moral statistics. Bosco, in his monograph on homicide in the United States, shows that the unskilled labourer is most addicted to homicide, and that this kind of crime is most rare among the liberal professions. Yet another subdivision of moral statistics is the moral statistics of the population according to civil condition—married or single, widowers or widows. In the third volume of the *Zeitschrift für Socialwissenschaft*, Julius Wolf points out that in Germany widows are more addicted to crime, suicide, and prostitution than women who have husbands. Wolf accounts for the moral degradation of widows by attributing it to the wretched economic conditions into which a large proportion of them are plunged by the loss of their husbands.

We have another division of moral statistics in the moral statistics of sex and age. Moral statistics of every kind exhibit the difference which exists between the sexes with respect to certain immoral or abnormal kinds of conduct. Such statistics show that women are on the whole less addicted to crime and suicide than men. They also show that the criminal age, and the age when suicide reaches its maximum, is not the same for

women as for men. But moral statistics, while giving these facts, do not give the explanation of them. This explanation must be sought in the social economic and biological condition of the sexes. In recent times the attempt to account for certain kinds of human conduct on biological grounds has led to an extension of the domain of moral statistics. Criminal anthropology is the name usually given to studies of this kind. Criminal anthropology attempts to explain the criminal act by a reference to peculiarities and abnormalities in the structure and functions of the individual who commits the crime. All these peculiarities are collected and tabulated; and when a convicted person exhibits a combination of them, he is declared to be a born criminal. One anomaly, or even two anomalies, are not necessarily sufficient to relegate the offender to this unfortunate class, and in most cases external conditions must co-operate with the anomalous personal conditions. But when the external and the personal conditions are both present, it is contended by the criminal anthropologist that the criminal act is the inevitable result. In many instances the theories of criminal anthropology have been carried too far, and the data on which these theories are based have not been subjected to a sufficiently rigid statistical and scientific scrutiny. But after all deductions have been made on this account an element of truth remains in the teachings of criminal anthropology. It is undoubtedly true that individuals of a degenerate physical or mental type are handicapped in the economic struggle for life. They usually find it hard to get or to retain employment. This fact alone has a powerful effect in driving them into the ranks of crime or suicide or insanity. It is possible that some creatures of this type may be purely the victims of a defective organization. But in the case of criminals it is practically impossible to prove this. All that can at present be adequately proved is that adverse biological conditions, unless counteracted by favourable social conditions, lead to social adversity, and social adversity in its turn leads to crime.

A summary of the preceding observations with reference to the subdivisions of moral statistics shows that such statistics may be classified in the following order:—international moral statistics; national moral statistics; local moral statistics; the moral statistics of classes, trades, professions; the moral statistics of civil condition; the moral statistics of sex and age; the moral statistics of biological condition. This classification might possibly be enlarged, but it contains the main heads of moral statistical inquiry.

A fruitful source of inquiry in the domain of moral statistics is the confrontation of one set of moral statistics with another; such, for instance, as the confrontation of the ratio of divorce and separation with the ratio of suicide, or the ratio of illegitimacy with the ratio of pauperism, or the ratio of education with the ratio of crime. When these confrontations are made, the problem is to discover whether there is merely a parallelism between the two ratios or a real causal connection.

Literature: Guerry, Statistique comparée (Paris, 1829); Quetelet, Physique sociale (Paris, 1869); A. von Oettingen, Die Moralstatistik (1882); A. Wagner, Die Gesetzmässigkeit in den scheinbar willkürlichen menschlichen Handlungen (Hamburg, 1864); Drobisch, Die Moralstatistik (Leipzig, 1867); Ruemelin, Reden u. Aufsätze (Freiburg, 1875); G. Mayr, Die Gesetzmässigkeit im Gesellschaftsleben (München, 1877); Schmoller, Zur Litteraturgeschichte d. Staats- und Socialwissenschaften (Leipzig, 1888); Morselli, Il Suicidio (1879; Eng. trans., 1881); C. D. Wright, Report on Marriage and Divorce in the United States (1889); Levasseur, La Population française (Paris, 1891); Richmond Mayo-Smith, Statistics and Sociol. (London, 1895); G. Mayr, Statistik u. Gesellschaftslehre (Freiburg, 1895); E. Durkheim, Le Suicide (Paris, 1897); W. Lexis, Handwörterb. d. Staatswiss., Vierter Band, Moralstatistik (Jena, 1892); A. Bosco, L'Omicidio negli Stati Uniti d'America (Roma, 1897); Bull. de l'Inst. Int. de Statistique; A. L. Bowley, Elements of Statistics (London, 1900). (W.D.M.)

Moral Theology: Ger. *moralische Theologie*; Fr. *théologie morale*; Ital. *teologia morale*. (1) The doctrines of theology developed as postulates of the moral as distinguished from the logico-speculative reason. (2) That branch of systematic theology which treats of morals in its theoretic and practical forms.

Moral theology in the first sense had its distinctive origin in Kant's separation of speculative and practical reason, and his derivation of the postulates of religion from the latter. This position was further developed by Lotze, in whose system the basis of theology is the judgment of worth or value. The modern Ritschlian movement in theology is in this sense moral rather than speculative.

In the second sense, moral theology includes ethics as a branch of Christian doctrine developed either dogmatically or speculatively, and casuistry, which treats of the application of ethical principles to practice.

Literature: KANT, Critiques of Pure and Practical Reason, and Religion within the Limits of Pure Reason; LOTZE, Metaphysics, and Philos. of Religion. Also see RITSCHLIANISM. (A.T.O.)

Morality [Lat. *moralis*, moral]: Ger. *Sittlichkeit*; Fr. *moralité*; Ital. *moralità*. (1) The relation of conduct or character to the moral standard. For different views as to the nature of the moral standard see ETHICAL THEORIES. (W.R.S.)

(2) Disposition or conduct which is ethically good, contrasted with immorality. (J.M.B.)

Morality, Moral Obligation, Moral Consideration (in law): Ger. *Naturalobligation* (moral obligation), (*gesetzliche*) *Moralität*; Fr. *obligation naturelle* (moral obligation), *moralité légale*; Ital. *obbligo* (in ethics), *moralità legale*. A Moral Obligation is a duty, for the violation of which the law gives no redress; a Moral Consideration is a just but not a legal consideration of a contract, and which therefore will not suffice to support an action in the contract; Morality, so far as such a conception as legal morality exists, is conformity of external conduct to the rules of law and equity (using 'equity' in its technical signification of the principles upon which courts of Chancery or equity act). See Pollock, *Jurisprudence*, chap. ii. 44.

Law and morality have in great part a common descent from custom. 'The word *mos*, from signifying what is customary, has come to signify what is right' (Markby's *Elements of Law*, § 118). The English chancellor was originally the keeper of the king's conscience, and decided causes upon his view of right. From the long succession of decisions in Chancery, certain principles of 'equity' were developed or generalized, which became accepted rules for all equity courts, and have replaced any direct appeal to the principles of morals (Pomeroy, *Equity Jurisprudence*, ii. §§ 49, 62, 424; Smith, *Right and Law*, § 49 ff.; Holland, *Jurisprudence*, chap. v. 50). Pothier, in his *Traité des Obligations*, art. prél., distinguishes between obligations imparfaites, like gratitude, which do not even bind one in conscience, and obligations naturelles, which are real duties, though not enforceable by law.

Literature: works above cited, and BENTHAM, Mor. and Legisl.; MAINE, Ancient Law, chap. i; CUQ, Les Institutions juridiques des Romains, Liv. I. iii, III. ii, and 'Conclusion.' (S.E.B.)

Morbid [Lat. *morbidus*, sickly, from *morbus*, a disease]: Ger. *krankhaft*; Fr. *morbide*; Ital. *morboso*. (1) Abnormal, diseased; thus morbid psychology is used as synonymous with ABNORMAL PSYCHOLOGY (q.v.). A morbid train of thought is one with an unwholesome trend, or one characteristic of an abnormal or an insane mind. (2) Specifically applied to an over-sensitive and usually morose state in which there is much self-conscious rumination and in which an exaggerated significance is attached to emotional fluctuations. (J.J.)

More, Henry. (1614–87.) An English divine, educated at Eton and Christ's College, Cambridge, where he held a fellowship from 1639.

Morphology [Gr. μορφή, form]: Ger. *Morphologie*; Fr. *morphologie*; Ital. *morfologia*. The philosophical study of comparative anatomy, being chiefly concerned with the genesis and homology of the structure and parts of living organisms. First used by Goethe, in 1817, to denote the study of form.

Literature: HAECKEL, Gen. Morphologie (1868); CARUS, Gesch. d. Zool.; art. 'Morphology' in Encyc. Brit. (9th ed.). (E.S.G.)

Mosaic Theory (of vision): Ger. *mosaische Theorie* (*des Sehens*); Fr. *théorie mosaïque* (*de la vue*); Ital. *teoria mosaicistica* (*della visione*). A theory put forth by Johannes Müller to explain the vision of Arthropods possessed of compound eyes.

Insects, Crustaceans, and other Arthropods are provided with eyes having many facets, under which are grouped retinal elements surrounding a crystalline cone. According to the Mosaic theory, the whole image seen is made up of a number of minute points, corresponding to the facets, which combine to form one picture. According to the rival theory advocated by Gottsche and others, each element of the compound eye yields a small but complete image.

Literature: J. MÜLLER, Zur vergl. Physiol. d. Gesichtssinnes (1826); GOTTSCHE, Beitr. z. Anat. u. Physiol. d. Fliegen u. Krebse, Müller's Arch. (1852); J. LUBBOCK, The Senses of Animals (1888). (E.S.G.)

Motion [Lat. *motus*, moved]: Ger. *Bewegung*; Fr. *mouvement*; Ital. *moto* (on all the foreign equivalents, cf. MOVEMENT). From the point of view of physics, motion is change in the relative position of two bodies;

but this, as Locke truly observes, is to translate and not to define, for 'change' and 'position' already involve the idea of motion, which cannot in strictness be defined, but only exhibited in concrete experience. Motion involves the ideas of space and time, between which it seems in a sense to mediate. We measure space by the time which a body takes to move from one part of space to another. In doing so our ultimate standard of time is 'the constant and regular succession of ideas in a waking man' (Locke, *Essay*, ii. 14, 11); but a convenient objective measure of time is subsequently found in certain uniformly recurring spatial movements, such as those of the earth and the sun.

The part of physics which deals with the theory of motion in its purely geometrical aspect is called kinematics. 'When the mutual action between bodies is taken into account, the science of motion is called KINETICS (q. v.), and when special attention is paid to force as the cause of motion, it is called DYNAMICS' (q. v.) (Clerk Maxwell, *Matter and Motion*, art. 36).

Heraclitus is the first philosopher to insist on the fact of movement as constituting the most characteristic aspect of the universe; but he is content to state the general fact of change or process without distinguishing its different forms. Treating it, moreover, as an ultimate fact, he does not inquire into the cause of motion (*ὅθεν ἡ ἀρχὴ τῆς κινήσεως*). The Eleatics, on the other hand, treated the fact of motion as an illusory appearance, and the arguments of ZENO (q. v.) against its possibility—founded chiefly upon the infinite divisibility of space—are among the best known pieces of ancient dialectic. The Atomists, by reducing all change to movement of the atoms in empty space, were the first to formulate the modern physical conception of motion. They conceived this motion as eternal, and found it sufficiently explained by the fall of the atoms through infinite space. Empedocles sought a cause of motion in the mythical forces of love and hate; and Anaxagoras, by tracing it to the action of *νοῦς*, or mind, made an epoch in Greek philosophy, even though mind was conceived by him quasi-materialistically as communicating a mechanical impact to his atomic elements. The most instructive account of motion in ancient times is to be found in Aristotle, who sees in *κίνησις* the most universal characteristic of nature. Physics, as contrasted with First Philosophy, deals with existence not in itself, but in so far as it participates in *κίνησις*. Taking *κίνησις* in its widest sense, he distinguishes three varieties—*ἀλλοίωσις*, or qualitative change; *αὔξησις καὶ φθίσις*, quantitative increase or decrease; and *ἡ κατὰ τόπον φορά*, or movement in space. Of these the last is the fundamental form, as involved in the others, but Aristotle does not, like the Atomists, reduce qualitative differences to purely quantitative relations of size and position. Aristotle teaches the eternity of motion, as he teaches the eternity of the world, but he seeks the explanation of motion in an eternal mover, itself unmoved (*τὸ πρῶτον κινοῦν ἀκίνητον*, *Physics*, 8. 6, 258 B). This eternal principle of movement is God—conceived, however, not mechanically (and therefore not materialistically) as with Anaxagoras, but teleologically, as the immanent end and real explanation of the whole world-process. This is known as Aristotle's doctrine of 'mover and moved.'

The most recent philosophy still presents the same conflict between what may be called the Democritic and the Aristotelian—the mechanical and the teleological point of view. The modern mechanical theory, substituting gravitation for the 'fall' of the atoms, would reduce the world to a physical problem of the continual redistribution of matter and motion. But gravitation is after all a law rather than a force; and like all scientific laws, it furnishes us with a generalized description of what happens, but does not (at least, ought not to) profess to explain these happenings in the sense of assigning their true cause. The opposite view is that the true cause or ultimate explanation of any process always involves the conception of end; as Aristotle insists, the end, though apparently the last resultant, is first in the order of real existence.

Descartes' doctrine that the quantity of motion in the universe is constant, and the controversies to which it gave rise, belong to the history of physics rather than to that of philosophy. Cf. CONSERVATION, ENERGY, PHORONOMY, and ACTIVITY. (A.S.P.P.)

Motion (illusions of): see ILLUSIONS OF MOTION AND MOVEMENT, I.

Motion and **Rest** (in physics): Ger. *Bewegung und Ruhe*; Fr. *mouvement et repos*; Ital. *moto e riposo*. Motion is change of place; a phenomenon too familiar to need detailed definition. See MOTION. Rest is absence of motion.

Motion has two properties:—

(1) It is *continuous*: no body changes its position from a point *A* to another point *B*

except by passing through an unbroken series of intermediate positions, which, if the body is regarded as a point, will form a line.

(2) Motion can be apprehended only as *relative*. In space itself there is no such thing as sameness of position. Position can be defined only with respect to the position of a body. Given one such body, and only one, there will be no way of determining whether it is in motion or at rest. Given two bodies, either may be in motion relative to the other; but of neither can we say that it is in motion or at rest when considered by itself. Motions on the earth's surface are familiarly conceived with reference to that surface. But the earth itself is in motion on its axis, and this axis moves around the sun. Thus motions around us are very different when we refer them to the earth's centre, or to the sun. The sun itself is in motion relative to the other stars, and thus we may have another link in the chain, the end of which we cannot conceive. (S.N.)

Motive [Lat. *motus*, from *movere*, to move]: Ger. *Motiv*; Fr. *motif*, *mobile* (AFFECT, q. v.); Ital. *motivo*. (1) Any conscious element considered as entering into the determination of a volition.

(2) Any conscious END (q. v.) considered as entering into the determination of a volition.

The first definition is better and is recommended, principally for the reason that the term end is sufficient to express the second meaning. There is great confusion of the two meanings with each other. The second usage arises from the attempt to prove that all motives are intellectual, and of the nature of ends. There is need, however, for a term of the wider signification; and the division of ends from other motives, in the first sense, may be marked by the term AFFECT (q. v.), as is recommended under that topic. Affects are the motives, however uncognized and affective—such as organic sensations, vital sensations, dispositions of an emotional or conative sort, &c.—which do not have the character of presentation in idea. They also include the negative determining or limiting (massgebende, Wundt) conditions of a voluntary decision. Ends, on the other hand, are the motives which do have the character of presentation in idea.

The broader definition (1) had early statement in Bentham (*Introd. to the Princ. of Mor. and Legisl.*, 1789, chap. x. § 1), i.e. 'Anything that can contribute to give birth to, or even to present, any kind of action,' or 'Anything whatsoever which, by influencing the will of a sensitive being, is supposed to serve as a means of determining him to act, or voluntarily to forbear to act, upon any occasion.' (J.M.B.–G.F.S.)

When two or more ends are presented as desirable, either simultaneously or in immediately succeeding states of consciousness, we have the experience known as 'conflict of motives,' the conflict being terminated by a voluntary decision or choice. The denial of the appropriateness of the term 'conflict of motives' is due to the limitation of the term 'motive' to an experience in which the motive actually issues in action—a limitation which appears to be an unnecessary restriction of the prevailing use of the term. The term 'controlling motive,' applied to that motive to which the decision most nearly conforms, is unfortunate, since it is difficult to say what it controls, and also since the course chosen is rarely true to any one of the alternative motives. (W.R.S.–J.M.B.)

Literature: the textbooks of psychology and ethics. For the distinction between the two definitions see citations under AFFECT. Cf. STOUT, Manual of Psychol., Bk. IV. chap. x; D. G. RITCHIE and others in Int. J. of Ethics, iv. 89, 229. A notable discussion from the point of view of the second definition is that of GREEN, Prolegomena to Ethics, Bk. II. chap. i. (J.M.B.–W.R.S.)

Motor [Lat. *motum*, from *movere*, to move]: Ger. *motorisch*; Fr. *moteur*; Ital. *motore*. Pertaining to the apparatus and consciousness of action.

The term is opposed to sensory, which is applied to the apparatus and consciousness of the reception of experience. Motor is used in various phrases, such as VASO-MOTOR (q. v.), 'motor consciousness,' 'motor reaction.' It characterizes also the type of psychological theories which explain complex mental products more or less in terms of 'motor elements' (i.e. sensations from muscular and physiological movements), and of conations. See MOVEMENT, and cf. SENSORY AND MOTOR ELEMENTS. (J.M.B., G.F.S.)

Motor Intuition: see INTUITION (in psychology).

Motor Type: see TYPE (mental).

Movement [Lat. *movere*, to move]: Ger. *Bewegung* (used also for motion); Fr. *mouvement*; Ital. *movimento*. (1) Motion of any sort.

(2) Organic action; cf. MOVEMENT (in physiology).

(3) Action of the motor apparatus.

There is great confusion as between these meanings in all the languages cited. Movement is used (1) in the broadest possible sense to cover mechanical motion. But there is a distinct tendency to restrict the term motion to the mechanical, and to use movement (2) for the action of organisms, in which vital or psychological processes complicate the phenomena. The further restriction contained in definition (3) has arisen in psychology, where the distinction between the motor and the sensory processes, and their correlative psychological states, has made the term movement in this sense convenient. On the whole, it is safe to recommend that the term be restricted in psychology to meaning (3); that, nevertheless, its use in sense (2) be recognized in physiological discussions; but that, so far as possible, the distinction between movement and motion be observed, the latter having exclusive application to the objective phenomena of change of place. For example, I make a movement of my arm; but I observe by sight the motion of a bird through the air. For the midway cases of one's observation of his own movement, the term movement is preferable, as in the phrases 'movement sensations,' 'illusions of movement,' &c.; yet when these are classed with other phenomena of motion, the latter term should be applied to them.

Psychological theories in the realm of movement are largely concerned with the formulations respecting conation—with reflexes, instincts, and voluntary determinations—on the side of consciousness; and with those of reaction, dynamogenesis, theory of kinaesthetic sensations and equivalents, on the side of the organism; together with the motor and 'action' theories, which assign to elements of motor content—attitudes, dispositions, habits, accommodations, &c.—important rôles in mental development. The discussions of effort, fatigue, and emotional expression, and the investigations into the localization of the motor areas of the brain cortex, have emphasized the tendency to make active accommodation and its requirements at least as essential as are the cognitive and receptive functions—a point of view quite undeveloped until this generation. The two sides of the mental life, however, are more sharply distinguished for the purposes of theory than from any fundamental difference of kind; for the movement elements are throughout sensational in their origin, and accordingly the reduction of the motor to the sensory continuum seems to be legitimate. The theoretical question then concerns the determination of the sensational elements—muscular and kinaesthetic—which, in their function as determining motor accommodation and control, minister to the progress of the mental life. This is where motor or action theories get their value; and it is being fully recognized in current discussion.

The analysis of a given movement function, of which HANDWRITING (q. v.) may be taken as a good example, results in the establishment of certain factors: (1) a 'copy series,' which is held up to be reproduced. (2) The acquisition, by a process of selection through experimentation, of the series of kinaesthetic equivalents required for reproducing the 'copy-series'; this we suggest calling the 'efficient series.' (3) The association of the efficient series with any 'remote' sensation series (cf. KINAESTHETIC SENSATION) which enters into the accomplished movement. (4) The establishment of a 'control series,' by which the efficient series is, term by term, held to its proper course in each successive performance of the movement. Of these elements the first is not kinaesthetic, but is a copy presented by sight, hearing, or other sense, to the reproduction of which the muscular apparatus is made to bend its energies. The second, the efficient, is gradually brought into conformity with the copy. The third comes to take the place of the copy, so that short-cuts are established, allowing the performance of the movement without the original copy-series. The fourth is found in that one—or all—of the series in question which stands to check and guide the performance of the movement. It establishes what is called the control of a movement, and may be looked at a little more closely.

The phenomenon of muscular performance with control seems to have two elements, more or less distinct from each other: release and actual control. The release is found in the conscious 'equivalent,' of the kinaesthetic order, which, when held in the attention, serves as preparation for the voluntary execution of the efficient series. Without attention successfully given to the equivalent the movement is impossible; this is shown in cases of patients who cannot move a limb unless that limb be seen—the equivalent being visual. The control, on the other hand, is not essential to the movement, but regulates it. It consists of the holding in the attention, together with the efficient series, of a

secondary or auxiliary series, seen negatively in handwriting with the eyes closed: the hand goes astray, because of the absence of the optical perception of the letters as they are made. This latter, when present, acts as control in the progress of the writing, although without it writing of an irregular and unformed kind is still possible.

The most adequate theory of the mechanism of control makes it a function of attention, which effects a synthesis of all the elements necessary for the perfected movement; certain more important series, however, taking the lead in this case or that. Interesting differences among individuals are brought out in pathological cases: to some, from their mental type, habit of performance, or emphasis in learning, one series is more necessary; to some another, in the performance of the same motor function. Furthermore, there is the fact of progressive automatization of function in the matter of control, as elsewhere. Such a semi-automatic performance starts with the same release; but the attention is given not to the details of the successive stages of the action, but to the act as a whole. In these cases, the attempt to control the movements by giving attention to the individual terms of the control series delays and disturbs the action.

See, besides the various topics mentioned, MUSCLE, ILLUSIONS OF MOTION AND MOVEMENT, and SYNERGY.

Literature: the textbooks of psychology, and the citations made under the various topics indicated; also BIBLIOG. G, 2, *p*, et al. On muscular control see under HANDWRITING; also JANET, Automatisme psychol.; PICK, Zeitsch. f. Psychol., iv. (1892) 161; and in general the literature of the various motor processes and of ATTENTION. Distinctively 'motor' or 'action' theories are developed in the works of MÜNSTERBERG (see the résumé in Grundz. d. Psychol., i. chap. xv, with literature); FOUILLÉE, Les Idées-Forces; STOUT, Manual of Psychol.; BALDWIN, Ment. Devel. (2 vols.). (J.M.B., G.F.S.)

Movement (disorders of). Disorders of movement may be due to irregularities in (1) the execution or control of the action, or in (2) the relation of the action to its motive impulse. The former constitute true motor disorders; the latter are of the nature of affections of the will, impairing action. See WILL (disorders of).

(1) True movement or motor disorders of psychological interest may be grouped as (*a*) inability to execute (certain types of) movement or their imperfect and difficult execution owing to an impaired co-ordination; and as (*b*) inability to restrain or control (certain types of) movement. The former group includes paralyses and pareses, contractures, ataxias, &c.; the latter tremors, spasms, convulsions, movement-habits (choreic movements, tics, &c.). The movements thus considered are in most part of a voluntary type; but disorders of reflex and automatic movements also occur. Such conditions as rigidity, flexibilitas cerea, catalepsy, illustrate abnormal motor symptoms, in which a psychic element is prominent. The physiological and medical aspect of motor disorders is concerned with their relations to degenerations and irritations in spinal and higher nervous centres, to diseases of nerve and muscle tissues, and to defective nutritional conditions.

The detailed and systematic account of the nature of motor disorders is to be found in the standard works on diseases of the nervous system; they are there treated as symptoms in connection with organic and functional disabilities of nerve and nerve-centre; special attention is given to the differential diagnosis of motor affections resulting from peripheral and from central defect, and again to the correlation of the symptom-complex with the specific grade of centre involved (cortical, spinal, &c.). PARALYSIS (q.v.), for instance, is a most common symptom of disease of the peripheral nervous system, but may be the result of lesion of brain or cord. A paralysis affecting the distribution of one nerve, and completely so, and depriving the muscle of its tone, thus producing a flaccid palsy (without secondary contracture), is recognized as of peripheral origin. Paralyses of cortical origin have other characteristic differentia.

A group of neuroses in which the motor disorders form the most conspicuous symptoms are sometimes termed spasmodic neuroses. They include chorea, with its convulsive movements, contortions, tremors, &c.; tetanus, with its characteristic contracture, facial and other local spasms, the professional neuroses, such as writer's cramp, the convulsive tics and motor habits which often exhibit sensitiveness to contagion and suggestion. The inco-ordinations of speech seen in stuttering, the ataxic symptoms of tabes, the epileptic fit, the spasms and convulsions of hysteria, the motor affections due to alcohol or other poisons, illustrate the range and variety of motor defects. See the various terms cited. (J.J.)

Movement (illusions of): see ILLUSIONS OF MOTION AND MOVEMENT, II.

Movement (in physiology): Ger. *Bewegung*; Fr. *mouvement*; Ital. *movimento*. Change of form of cells or organs brought about by power inherent in a tissue to rearrange its particles; as amoeboid movement: that resembling the changes of form of an amoeba; ciliary movement, muscular movement (see MUSCLE, and cf. MOVEMENT, 2, 3). (C.F.H.)

Movement and **Motion** (experiments on). The following are the chief topics of experimentation upon MOVEMENT (q. v.) and MOTION (q. v.). Cf. LABORATORY AND APPARATUS, II, A, B, (*c*), (3–5).

(1) Movement and its perception. (*a*) Liminal (least perceptible) movement. The various joints differ considerably in the extent of the least perceptible passive movement; for the forefinger the threshold is 1·03°–1·26°; wrist, ·26°–·42°; elbow, ·40°–·61°; shoulder, ·22°–·42° (Goldscheider, *Arch. f. Physiol.*, 1889, 486); the thresholds for active and passive movement are about equal (ibid., 1889, Suppl.-Bd., 141); a slower rate of movement raises the threshold (ibid., 1889, 369). See also EYE-MOVEMENTS. (*b*) Comparison of movements: repetition of movement with same hand or arm, to determine least perceptible difference in extent; relations of extent between movements of the two arms (either successive or simultaneous); relations of symmetry and form between simultaneous movements of the two arms. Cf. Loeb, *Pflüger's Arch.*, xli. (1887) 107; xlvi. (1890) 1–46; Hall and Hartwell, *Mind*, ix (1884), 93; Münsterberg, *Beitr. z. exper. Psychol.*, Heft iii. 65, Heft iv. 192; Baldwin, in *Science* (1890). (*c*) ILLUSIONS OF MOTION AND MOVEMENT (q. v.).

(2) Motion and its perception. The motion of an object is most frequently judged by comparison with some subjective movement, e. g. following it with the eye (cf. EYE-MOVEMENTS). In special cases the two are separated: (*a*) Motion upon the skin when the member is at rest; experiments here include least perceptible distance (on various parts of the body), judgment of direction, judgment of rate, comparison of different distances. Cf. Hall and Donaldson, *Mind*, x. (1885) 551; Tawney and Hodge, *Psychol. Rev.*, iv. 591. (*b*) Motion of the body as a whole, progressive or rotary; direct perception is here limited to change of rate; in rotary motion, the least perceptible change is about 5° per second. Cf. Mach, *Grundlinien d. Lehre v. d. Bewegungsempfindung*; Warren, *Psychol. Rev.*, ii. 273. See ILLUSIONS OF MOTION AND MOVEMENT.

(3) Execution of voluntary movement. (*a*) Time. See REACTION TIME. (*b*) Precision; effect of practice; 'cross-education,' e.g. gain of precision with one arm as a result of practice with the other. Cf. Scripture, Smith, and Brown, *Yale Stud.*, ii. 114. (*c*) Rate. Cf. Galton, *Rep. Anthropom. Lab.*, 1885; Fullerton and Cattell, *On the Perception of Small Differences* (1892). (*d*) Force; adjustment of motor discharge to expected resistance. Cf. Müller and Schumann, *Pflüger's Arch.*, xli (1891), 119; Delabarre, *Ueber Bewegungsempfindungen* (1891); Fullerton and Cattel, loc. cit.; Delabarre, Logan, and Reed, *Psychol. Rev.*, iv (1897), 615. (*e*) FATIGUE (q. v.). (*f*) Passage of voluntary into automatic movement. Cf. Solomons and Stein, *Psychol. Rev.*, iii. 492, and v. 295; the literature given under HABIT and REACTION TIME (effects of practice).

(4) Involuntary movement. (*a*) Reflexes (knee-jerk, &c.). See REFLEX, and PATELLAR REFLEX. (*b*) Tremor of hand. See Jastrow, *Amer. J. of Psychol.*, iv, v; Tucker, ibid., viii. (*c*) Accommodation and convergence. Cf. EYE-MOVEMENTS. (*d*) Jerking of eyes. Cf. EYE-MOVEMENTS. (*e*) Motor expression of emotion. Cf. EMOTIONAL EXPRESSION. (H.C.W.)

Mover and **Moved** (in Aristotle): see MOTION, passim, and PRIMUM MOBILE.

Müller, Friedrich Max. (1823–1900.) Born at Dessau, Germany; educated at Leipzig and Berlin Universities. Settled at Oxford in 1848, and became professor of comparative philology in Oxford University in 1868. His fame was principally as a philologist and orientalist, although he wrote also on philosophical and psychological topics.

Müller's Circle: Ger. *Müller'scher Kreis*; Fr. *cercle de Müller*; Ital. *circolo del Müller*. A circle which passes through the fixation point and the optical centres of the two eyes, and which lies in the plane of regard when the eyes are in the primary position of convergence. Cf. HOROPTER. (E.B.T.)

Multiplicity: Ger. *Vielheit, Mannigfaltigkeit*; Fr. *multiplicité*; Ital. *moltiplicità*. This term appears in connection with the problem of the One and the Many which so early agitated Greek philosophy. How, that is to say, are we to reconcile the aspect of the world as consisting of an apparently infinite number of separate beings with the unity of existence which philosophic reason de-

mands? Cf. One (the), and Unity and Plurality.

The Eleatic philosophy pronounced the appearance of multiplicity to be an illusion of the senses; and Zeno, by a series of indirect arguments, endeavours to demonstrate its impossibility. The same problem (ἓν τὰ πολλὰ εἶναι καὶ τὸ ἓν πολλὰ) reappears in Plato, who reduces the multiplicity of sense-phenomena to the unity of the idea in which they participate or which they represent. The multiplicity of the sense-world appears to be regarded here also as a species of illusion. But Plato recognizes a multiplicity within the ideal world itself, in virtue of what has been called the community of concepts (κοινωνία τῶν γένων), or the participation of the ideas in one another. This world of ideas thus differs from the abstract unity of the Eleatics in being rather a series of ideas which dialectically imply one another. As he says in the *Philebus* (15 D): 'The One and the Many run about everywhere together, in and out of every word which is uttered, as they have done in all time past as well as present; and this union of them will never cease, and is not now beginning, but is, I believe, an everlasting quality of thought itself, which never grows old in us.'

The same question of the One and the Many is the underlying motive of the scholastic disputes between nominalism and realism, and gives a pantheistic or an individualistic bias to the systems of most philosophers.

In the Kantian philosophy, the contribution of sense to knowledge is spoken of as a mere Manifold (*Mannigfaltiges*), a multiplicity or diversity of particulars. The synthetic function of the understanding must supervene with its categories or connective notions upon these passively apprehended units of sense before we can speak of knowledge or experience. (A.S.P.P.)

Multitude (in mathematics) [Lat. *multitudo*]: Ger. *Mächtigkeit, Cardinalzahl*; Fr. *puissance*; Ital. *moltitudine*. That relative character of a collection which makes it greater than some collections and less than others. A collection, say that of the *A's*, is *greater than* another, say that of the *B's*, if, and only if, it is impossible that there should be any relation r, such that every A stands in the relation r to a B to which no other A is in the relation r.

The precise analysis of the notion is due to G. Cantor, whose definition is, however, a little different in its mode of expression, since it is more abstract. He defines the character in these words: 'By Mächtigkeit or cardinal number of a collection (Menge) M, we mean the universal concept, which by the help of our active faculty of thought results from the collection M by abstraction from the characters of the different members (Elemente) of that collection and from the order in which they are given (Gegebensein).

A cardinal number, though confounded with multitude by Cantor, is in fact one of a series of vocables the prime purpose of which, quite unlike any other words, is to serve as an instrument in the performance of the experiment of counting; these numbers being pronounced in their order from the beginning, one as each member of the collection is disposed of in the operation of counting. If the operation comes to an end by the exhaustion of the collection, the last cardinal number pronounced is applied adjectivally to the collection, and expresses its multitude, by virtue of the theorem that a collection the counting of which comes to an end, always comes to an end with the pronunciation of the same cardinal number.

If the cardinal numbers are considered abstractedly from their use in counting, simply in themselves, as objects of mathematical reasoning, stripped of all accidents not pertinent to such study, they become indistinguishable from the similarly treated ordinal numbers, and are then usually called *ordinal numbers* by the mathematico-logicians. There is small objection to this; yet it is to be remarked that they are ordinal in different senses in grammar and in the logic of mathematics. For in grammar they are called ordinal as being adapted to express the ordinal places of other things in the series to which those things belong; while in the logic of mathematics the only relevant sense in which they are ordinal is as being defined by a serial order within their own system. The definition of this order is not difficult; but the syntax of ordinary language does not lend itself to the clear expression of such relations in the manner in which they ought to be expressed in order to bring out their logical character. It must, therefore, be here passed by. In fact, none of the doctrines of logic can be satisfactorily expressed under the limitations here imposed, however simple they may be. The doctrine of ordinal numbers is by Dedekind (*Was sind und was sollen die Zahlen?*) made to precede that of the cardinal numbers; and this is logically

preferable, if hardly so imperative as Schröder considers it.

The doctrine of the so-called ordinal numbers is a doctrine of pure mathematics; the doctrine of cardinal numbers, or, rather, of multitude, is a doctrine of mathematics applied to logic. The smallest multitude is most conveniently considered to be *zero*; but this is a question of definition. A *finite* collection is one of which the syllogism of transposed quantity holds good. Of finite collections, it is true that the whole is greater than any part. It is singular that this is often taken as the type of an axiom, although it has from early times been a matter of familiar knowledge that it is not true of infinite collections. Every addition of one increases a finite multitude. An infinite collection cannot be separated into a lesser collection of parts all smaller than itself.

The multitude of all the different finite multitudes is the smallest infinite multitude. It is called the *denumeral* multitude. (Cantor uses a word equivalent to *denumerable*; but the other form has the advantage of being differentiated from words like *enumerable*, *abnumerable*, which denote classes of multitudes, not, like *denumeral*, a single multitude.) Following upon this is a denumeral series of multitudes called by C. S. Peirce the *first*, *second*, &c. *abnumerable* multitudes. Each is the multitude of possible collections formed from the members of a collection of the next preceding multitude. They seem to be the same multitudes that are denoted by Cantor as *Alephs*. The first of them is the multitude of different limits of possible convergent series of rational fractions, and therefore of all the quantities with which mathematical analysis can deal under the limitations of the doctrine of limits. (The imaginaries do not increase the multitude.) What comes after these is still a matter of dispute, and is perhaps of inferior interest. The transition to continuity is, however, a matter of supreme importance for the theory of scientific method; nor is it a very complicated matter; but it cannot be stated under the limitations of expression here imposed upon us. (C.S.P., H.B.F.)

Literature: see NUMBER.

Mundane: see MUNDUS.

Mundus [Lat.]: Ger. *Welt*; Fr. *monde*; Ital. *mondo*. The term used by the Romans to render the Greek *κόσμος*, the visible orderly system of the world, with more particular reference to the heavens and the heavenly bodies, whose regular motions first impressed the idea of order on primitive thought.

Cicero's definition (*Tim.* 10) retains this reference: 'ut hunc hac varietate distinctum bene Graeci *κόσμον*, nos lucentem mundum nominaremus.' In so far as this system is contrasted with a preceding state of things—whether chaos or primitive elements—the *κόσμος* or *mundus* is regarded as limited both in time and in space, and is not therefore to be identified with the universe (*τὸ πᾶν*, *omne*). The Epicurean philosophy in particular supposes innumerable worlds (in some respects perhaps resembling, in many more probably differing from, the world-system we know) to result from the mechanical clashings of the atoms in infinite space throughout infinite time. Each world-system is girdled from the embrace of hungry space by an outer envelope of fire or ether—the 'flammantia moenia mundi' of Lucretius' account. In the 'intermundia' or intermundane spaces Epicurus supposed the gods to reside. Cf. Lucretius, *De rerum Natura*, iii. 16–22, finely rendered by Tennyson in his poem *Lucretius*.

The terms *mundus sensibilis* and *mundus intelligibilis* were used to express the Platonic contrast between the world of sense-perception, which is a world of phenomena or mere appearance, and the ideal world, the world of noumena or of ultimate reality. They were appropriated by Kant, in a somewhat altered sense, to denote the world of nature or of categorized sensation, to which he limits our knowledge; and the intelligible world (Verstandeswelt), which is for the theoretic reason a merely negative or limitative conception, but which the practical reason reveals as a realm of ethical ends and moral freedom. It is in connection with this Kantian distinction that the term mostly occurs in modern philosophical writing. (A.S.P.P.)

Mundane and extra-mundane are used respectively for what is and what is not subject to the conditions of the physical world. (H.R.S.)

Muscae Volitantes [Lat. *musca*, a fly, + *volitans*, dancing]: Ger. *fliegende Mücken*; Fr. *mouches volantes*; Ital. *mosche volanti*. Variable entoptic appearances, due to the presence of small foreign bodies in the vitreous humour. They take the form of bright worm-like threads, strings of glistening beads, groups of bright dots, tiny circles with brighter centres, &c., and usually travel downward in the field of vision (i. e. upward in the humour). Cf. ENTOPTIC PHENOMENA.

Literature: HELMHOLTZ, Physiol. Optik

(2nd ed.), 188; SANFORD, Course in Exper. Psychol., expt. 110. (E.B.T.)

Muscle [Lat. *musculus*, little mouse, dim. of *mus*, Gr. μῦς]: Ger. *Muskel*; Fr. *muscle*; Ital. *muscolo*. The active movements of animals are accomplished by means of a specially differentiated contractile tissue called muscle.

Contractility is a general property of living organisms manifested in amoeboid, ciliary, or muscular movements. Even in the unicellular Protozoa, certain portions of the cell-substance become specialized as contractile fibrils for executing movements, and in the lower Metazoa, such as the Coelentera (Polyps and Jelly-fish), cells of the outer and of the inner epithelium may develop special contractile basal processes. The muscular movements of the Coelomata are accomplished by means of special muscle-cells, or cross-striated muscle-fibres, developed from the mesodermal layer of the EMBRYO (q.v.). Muscle-cells chiefly are found in Worms, Molluscs, and Echinoderms; striated muscle-fibres in Arthropods. In the higher vertebrates, such as man, the 'smooth' muscle-cells are found in the walls of the intestine and other viscera, and of the blood-vessels. Their contraction is not under the direct control of the will, hence they are frequently called the involuntary muscular tissue. These muscles are formed of elongated cells pointed at both ends, consisting chiefly of longitudinally striated contractile substance, enclosed in a delicate sheath, and provided with an oval nucleus. The muscles of the heart are composed of peculiar fibres made of rows of flattened, more or less branched, cells exhibiting transverse striations. The voluntary or skeletal muscles, the contraction of which is under the direct control of the will, constitute by far the greater part of the muscular or fleshy portions of the body, and consist of cross-striated fibres.

The fibres are formed of a thin sheath (sarcolemma) enclosing the elongated, more or less cylindrical, soft muscular substance provided with numerous oval nuclei at its periphery. Under the microscope the muscular substance exhibits fine longitudinal and coarse transverse striations. The former seem to be due to the fact that each fibre is formed of a bundle of fine parallel fibrils (sarcostyles); whilst the cross striae are due to the alternation of narrow light with broader and more opaque regions. The denser and firmer substance of the sarcostyles appears to be the more actively contractile element, embedded in the more fluid substance (sarcoplasm) accumulated in the region of the light-zones. Contraction of the fibre is brought about by the shortening and swelling of the row of segments of the sarcostyles occupying the dark zones. Waves of contraction may pass along the fibre.

Muscles are formed of bundles of such fibres bound together in connective tissue and extending from one point of attachment to another. Movement of the parts is brought about by a drawing together of the points of attachment when the muscle contracts, portions of the bony skeleton often serving as levers.

The energy required for the muscular contractions is derived partly from carbohydrates, such as glycogen, stored in the muscle itself or brought to it by the blood, and probably also from fats.

Living muscle is very elastic and extensible. During contraction it shortens and becomes correspondingly thicker. On relaxation it reverts to its original shape by virtue of its elasticity. Normally, a muscle contracts on receiving a stimulus through its motor nerve; but it may be made to contract by the application of suitable mechanical, electrical, thermal, or chemical stimuli, either directly or indirectly by means of its nerve. A single stimulus causes a single 'twitch' of the muscle; the contraction is preceded by a very short 'latent period,' and is followed by a longer period of relaxation. On repeating the stimulus, the contractions at first slightly increase in strength, then begin to decrease, and steadily diminish, until finally the muscle reacts no more. This muscular 'fatigue' is due probably both to the accumulation of waste products and to the exhaustion of the materials which afford the source of energy. Within certain limits, the contraction of a muscle is proportional to the strength of the stimulus, being nil with less than minimal stimulus, and constant after the stimulus has reached its maximal intensity. A repetition of stimuli following each other so rapidly that the muscle has no time to relax, leads to the condition known as 'tetanus,' in which the muscle remains in a state of contraction until the stimuli cease or it is exhausted. Persistent voluntary contractions are considered by some physiologists to be of the nature of a tetanus.

Literature: E. A. SCHÄFER, Essentials of Histology, also in Quain's Anat. (10th ed.); textbooks of physiology, e.g. FOSTER'S, WALLER'S, 'American,' &c. For a full table of the human muscles, with figures, see GOULD, Illus. Dict. of Med., sub verbo. (E.S.G.)

Muscle Reading: Ger. *Muskellesen, Gedankenlesen* (thought reading); Fr. *lecture de la pensée* (thought reading); Ital. *lettura del pensiero* (thought reading). The interpretation through contact, such as grasping the hand, of slight involuntary movements or muscular contractions, and the detection thereby of the direction or object of another's thoughts.

The basis of muscle reading rests upon the tendency—a marked one in some individuals, and less so in others—of involuntary movements and impulses to motor expression to accompany mental operations. Such movements find most ready expression in the contraction of delicate and specialized muscle groups, of which the hand is a familiar example. Such involuntary movements, particularly of the hand, were offered in explanation of the phenomena of spiritualism, such as the rappings, table turning, and planchette writing. The phenomena of the divining rod have also been referred to involuntary movements (see letter of Chevreul, 1852, in Binet, *Alterations of Personality*, Eng. trans., 221). The experimental demonstration of these movements has been frequently made. For such purpose an apparatus is necessary by which the movements may be rendered visible. Such apparatus have been devised by Jastrow (*Fact and Fable in Psychol.*, 130) and Sommer (*Zeitsch. f. Psychol.*, xvi. 275). See Automatograph, under Laboratory and Apparatus, II, B, (*c*), (5).

In this way it has been proved that the thought of a particular corner of the room is likely involuntarily to direct the hand towards that corner, the direction of the attention towards a sound is apt to start a movement towards the locality of the sound, and so on. In brief, the local direction of the attention is more or less readily reflected in the accompanying involuntary movement. More recently it has been shown that involuntary whispering may also occur; and the movements of the larynx accompanying reading to oneself, the active thinking of certain sounds, &c., have been recorded. While the mere fact of movement not infrequently rises into consciousness, the directions and details of the movements remain unconscious and wholly involuntary. When, in susceptible persons, these movements become pronounced and directive, they develop into Automatic Writing (q. v.), planchette writing, &c. Ordinarily the movements fundamental to muscle reading involve only direction and local indication; but truly 'automatic' movements convey by symbols, such as writing, an indication of the content of the mover's thoughts.

Muscle reading as an expert performance has been exhibited by various performers from about 1874; it is often misleadingly termed mind reading and heralded as dependent upon a mysterious power to divine another's thoughts. The usual procedure is for the muscle reader to place the hand of his subject against his own forehead, and by noting the indications of the movements and of their direction and the moments of increased excitement, to find a hidden object, to select from a group of numbers the digits which compose the number of a bank-note of which the subject is thinking, and other more elaborate variations of such procedures. The skill with which such involuntary indications can be interpreted by an expert muscle reader —combined with a more general shrewdness and alertness—is remarkable, and many striking feats have been recorded. It may be stated as probable that, apart from general shrewdness, such performances (feats involving collusion or fraud are not considered in this connection) involve nothing more than the skilful interpretations of involuntary muscular contractions; but with this must be included not only definite movements, but exhibition of excitement (change of respiration, flushing, the hush of the audience when the muscle reader approaches the hiding-place, &c.), and all the various accompaniments of intense concentration. The process on the part of the muscle reader requires an extreme and wearing concentration, and some performers are only dimly conscious of their *modus operandi*. The difference in the readiness with which various subjects become helpful to a muscle reader is very great; but nothing more than general correlations of such motor tendencies with other nervous dispositions may be postulated.

We may name Cumberland, Bishop, Brown, Onofroff, Capper, Pikman, Dalton, Caselli, and others as expert performers.

Literature (on involuntary movements): Jastrow, Amer. J. of Psychol., iv. (1892) 398 ff., v. (1892) 223 ff.; Preyer, Die Erklärung des Gedankenlesens (1886); Hansen and Lehmann, Ueber unwillkürliches Flüstern, Philos. Stud., xi. (1895) 471–530; Curtis, Automatic Movements of Larynx, Amer. J. of Psychol., xi. (1900) 237–40. On muscle-reading performances: articles on Muscle Reading, Mind Reading, or Thought

Reading, in Nineteenth Cent., xx. 867; Forum, xi. 192; Pop. Sci. Mo., x. 459, xxi. 634 (Beard); Annual Encyc. (1887), 506. (J.J.)

On 'Pikmanism' or 'Cumberlandism' see articles by MORSELLI, TAMBURINI, GUICCIARDI, and FERRARI, in Riv. Sperim. di Freniat. (1891–9). See also OTTOLENGHI, La Suggestione e la Facoltà psichiche occulte (1900), 95–139; BEARD, The Study of Trance, Muscle Reading, &c. (New York, 1882); TARCHANOFF, Gedankenlesen (1895). (E.M.)

Muscle-sense and **Muscle-sense Illusions**: see MUSCULAR SENSATION, and ILLUSIONS OF MOTION AND MOVEMENT, II.

Muscular (or **Muscle**) **Sensation**: Ger. *Muskelempfindung*; Fr. *sensation musculaire*; Ital. *sensazione muscolare*. The phrase is used, loosely and vaguely, for (1) the complex of sensations arising from skin, joint, muscle, and tendon in such perceptions as those of resistance, of movement, and of lifted weight. It is thus the equivalent of Bastian's KINAESTHETIC SENSATION (q. v.); and for (2) a sensation of dull and diffused character obtained (after elimination of other sense-qualities) by stimulation of a striped muscle; localized, like articular sensation, within the stimulated limb. (E.B.T.–J.M.B.)

(3) A sensation of muscular fatigue which follows long-continued stimulation of a muscle, either voluntary (indirect) or non-voluntary (direct: electrical, chemical, &c.).

It is probable that muscular fatigue is a congeries of mixed qualities of the preceding sorts, (1) and (2). The question of its central or peripheral seat is now about settled in favour of the kinaesthetic view. Mosso and Waller have shown that intellectual work induces muscular fatigue. (J.M.B.)

Literature: The recognition of a distinct muscle sense appears to go back to ARISTOTLE (Hist. An., i. 4; De Part. An., ii. 1, 10; De Anima, ii. 11). It certainly goes back to SCALIGER (De Subtil., 1557). Cf. HAMILTON, ed. of Reid (1880), 867. The modern doctrine of the muscle sense may be said to begin with Sir CH. BELL. An excellent résumé to 1898 is by HENRI (Année Psychol., v. 1899), who (cf. also JOTEYKO, ibid., on muscular fatigue) traces the subject back to Descartes. Henri gives a bibliography of 391 titles. KÜLPE, Outlines of Psychol., 143; GOLDSCHEIDER, Du Bois-Reymond's Arch. (1889), 369, 540, and Suppl.-Bd.; BASTIAN, Brain as Organ of Mind, 691; SANFORD, Course in Exper. Psychol., expt. 26; FULLERTON and CATTELL, Perc. of Small Differences (1892); BEAUNIS, Les Sensations internes; E. GLEY, Rev. Philos. (Dec., 1889); L. MOULDER, Expériences sur le Sens musculaire, Rev. Philos. (April, 1887); MORSELLI, Semej. malat. ment., ii (1895); E. CLAPARÈDE, Du Sens musculaire. See also the citations under FATIGUE (mental). (E.B.T.–L.M.–J.M.B.)

Music [Gr. *μουσική*]: Ger. *Musik*; Fr. *musique*; Ital. *musica*. The fine art which employs tones produced in rhythmic succession.

Making rhythm the essential to music, complex effects are produced by added factors, notably melody, in which the succession is marked by recurring similarities, and HARMONY (q. v.), in which complex simultaneous tone effects are employed.

The problems connected with music are principally the following. (1) The essential factor or factors. (2) The enhancing of the musical effect by the additional factors: how and why harmony, for example, is combined with melody in a musical whole. (3) The origin of music and its development as a fine art. (4) The relation of music to the other arts in general aesthetic theory (cf. ART AND ART THEORIES, and CLASSIFICATION of the fine arts). (5) The nature of musical enjoyment; its emotional and other psychological elements.

The origin of music has been found by some in association with the early dance, the latter being held to have supplied the element of rhythm to which rude instruments beat the accompaniment. Others connect music with spontaneous cries, particularly those of the mating season. The song of birds is the best illustration of the employment of successive notes for the purposes of instinctive expression.

As to the 'meaning' or 'expression' conveyed by music, the two current views are widely apart. Some hold—and possibly the best psychological opinion is with this view—that the musical effect is purely a sensuous one; when, however, the sensuous ingredients of higher emotional and sentimental states are aroused through this connection, the music itself is considered to express or 'mean' the emotion or sentiment. General moods and dispositions are, no doubt, ministered to by music, through differences of rhythm, &c., and so come to be expressive to the hearer, of what he already finds in himself. The other theory—held principally by musicians, who are certainly entitled to an opinion—maintains that music is expressive of emotions and thoughts; indeed, that a musical composition is analogous to a drama in the unfolding and

presentation of a theme or narrative. The views of musicians, however, are generally mystical and obscure.

Literature: SPENCER, Princ. of Sociol.; WALLASCHEK, The Origin of Music; HIRN, The Origins of Art; works on HARMONY (q. v.). Also HELMHOLTZ, Sensations of Tone (Eng. trans.); GROVE, Dict. of Music; GURNEY, The Power of Sound; the literature of Wagner and Wagnerism. (J.M.B.)

Musical Tone: Ger. *Ton, Klang*; Fr. *son*; Ital. *suono* (or *tono*) *musicale*. See TONE (and CLANG), and COMPOUND TONE.

Mutation (in biology) [Lat. *mutare*, to change]: Ger. *Mutation*; Fr. *mutation*; Ital. *mutazione*. A term introduced by W. Waagen to denote the hypothesis that the causes of modification lie deep in the specific nature and affect uniformly large numbers of individuals simultaneously. Cf. VARIATION.

The essence of this idea, like many another rechristened at a later date, passed through the mind of Darwin, was weighed and found wanting. Thus, long before natural selection had presented itself to him, he wrote of the causes of extermination acting from within the specific nature and leading to the simultaneous dying-out of the whole of the individuals of a species spread over, perhaps, a vast tract of country. He also thought of such species as compelled by their constitution to change into other species or else to die out. W. B. Scott has argued that the evidence of paleontology is consistent with 'that steady advance along certain definite lines which Waagen called mutation,' while he considers it inconsistent alike with (1) the 'discontinuous evolution' of W. Bateson, or 'transilience' of F. Galton, depending on the occurrence of large variations, and with (2) the accumulation of minute individual differences by natural selection. The former criticism is undoubtedly well aimed. Bateson's statement is an account of what he believes has happened rather than a theory of causes. Paleontology is an account of what has happened; and whenever it yields a complete account, the history is continuous and not discontinuous. On the other hand, the record of paleontology is exactly what the natural-selectionist would expect. W. B. Scott indeed says, 'The direct, unswerving way in which development proceeds, however slowly, is not suggestive of many trials, and failures in all directions save one.' The contemplation of a series of pigeons' skeletons, from the most modern product of artificial selection right back to the ancestral rock dove, would lead this distinguished paleontologist to similar conclusions, did he not in this case know the history and the creative part selection has played. The phenomena mutation has been invoked to explain are precisely the phenomena we should expect to appear if evolution has been the product of the action of natural selection upon minute individual differences. The upshot of the struggle for existence as we see it waged to-day, with its 'many trials' and 'failures in all directions save one,' the one which leads to the survival of a minute fraction of each generation, could, with our present knowledge, but rarely be inferred from a study of the skeletons of the individuals concerned. How much less should we be justified in expecting to reconstruct the details of its operation by a careful study of the skeleton of forms, of which in the living state nothing directly is known? But while we cannot expect, as yet, to recover these details, the general trend of evolution is exactly what the selectionist would anticipate, exactly what is unexplained by any other theory than natural selection; viz. an advance along a line of ever more perfect adaptation to their past environments, so far as their main features can be reconstructed. (E.B.P.)

The theory of mutation seems to have received some support from a research of de Vries published since the above paragraphs were written, although it is too early to judge as to its permanent value. The following passage is quoted from an article signed J. P. K. in *Nature*, June 27, 1901 :—

'De Vries has just published the first part of a book entitled "*Die Mutationstheorie*. Erster Band. Versuche und Beobachtungen über die Entstehung von Arten im Pflanzenreich" (Leipzig: Veit, 1901), containing, as the title indicates, the account of a series of observations on the formation of new species in plants. Starting from the fact, well known to florists, of the appearance of "single variations" in their flower-beds, de Vries has been trying to find wild flowers which would show the same phenomenon. Of the 100 species investigated only one appeared to possess the property which was looked for, the *Oenothera Lamarckiana*, originally from America, but at present growing wild in Holland. Now about ten years ago de Vries transferred specimens of this plant to the botanical gardens at Amsterdam, and up to date he has studied as many as 50,000 of its descendants.

'Of these 50,000 about 49,200 were in no respect different from the original patriarchal *O. Lamarckiana*, showing no tendency towards gradual change in any special direction, but only the common small fluctuating "variations" as regards size and appearance on either side of a normal, in fact resembling in that respect other plants and animals which are left to themselves without being interfered with.

'Quite otherwise the 800 other plants. None of these, although appearing spontaneously, could be said to be representatives of the species *Lamarckiana*, from which they were descended. De Vries arranges them in seven distinct species, viz. 1 of *O. gigas*, 56 of *O. albida*, 350 of *O. oblonga*, 32 of *O. rubrinervis*, 158 of *O. nanella*, 221 of *O. lata*, and 8 of *O. scintillans*. Now comes the crucial question of the whole investigation. What right has de Vries to look upon the differences between these seven species and the original species as being of a different order from the variations between the specimens of each species, and what entitles him to call these differences *mutations* as opposed to variations? The answer is this: a representative of these new species produces descendants the majority of which unmistakably belong to the same species as itself. Not all the new species behave in the same way; as an instance, the only representative of *O. gigas* was isolated and made to fertilize itself. From it were obtained 450 plants, all of which, with only one exception, were *O. gigas*, the one exception not being a return to *Lamarckiana* but belonging to a new variety. The plant is a strong one and retains its properties in subsequent generations so far as investigated.

'The *O. albida*, on the other hand, which appeared frequently, is a weak plant, not very fertile, but perfectly constant so far as it went. The last species in the above list, the *O. scintillans*, differs from the others in this respect, that it is extremely unstable, i.e. possesses the property of mutation to a high degree, a large proportion of its descendants belonging to other species, specially *O. oblonga* and *Lamarckiana* itself.

'Enough has been said to show that de Vries has evidently made a momentous discovery. So far as his observations go, new species appear *suddenly* by *mutation*, never as the outcome of a progressive *variation*. . . . As we saw, some of the new species which made their appearance did not seem to be inferior in stability to the mother-species; on the other hand, one of the species, the *O. lata*, only appeared as female plants without pollen, and the *O. albida* did not show the same vitality as the others and was evidently doomed to disappear again. The observations, therefore, do not support the idea that in the formation of new species Nature is carrying out a definite plan; on the contrary, it all looks like accident. A new species may be one strong and fertile enough to remain, and possibly, under favourable conditions, replace the mother-species, but it may just as well be a sickly kind without any chance in the struggle for existence. For the struggle for life between individuals de Vries substitutes the struggle for continued existence between species, the new species always appearing suddenly.

'De Vries' views are thus directly opposed to the common form of the theory of evolution; not that the importance of the single variations had escaped attention altogether, but they were always lost sight of, and prime importance is generally attached to the selection through the ordinary variations. De Vries' experiments support the results arrived at by Scott and other paleontologists that there is no evidence in the successive strata of the earth of a gradual development of one species into another and that everything points at small but sudden transitions.' (J.M.B.)

Literature: W. Waagen, Die Formenreiche des Ammonites subradiatus, in Benecke's Geognost.-Palaeontol. Beitr., ii. 179–256; W. B. Scott, On Variations and Mutations, in Amer. J. of Sci. (1894), xlviii. 355; W. Bateson, Materials for the Study of Variation (London, 1894); Life and Letters of Charles Darwin (London, 1887); Conn, The Method of Evolution; Bailey, and de Vries (as cited above). (E.B.P.–J.M.B.)

Mutism [Lat. *mutus*, dumb]: Ger. *Mutismus*; Fr. *mutisme*; Ital. *mutismo*. The lack of development or the functional inhibition of the faculty of speech. It is contrasted with aphasia, which is defect or organic disturbance of speech. Cf. Speech and its Defects. (J.M.B.)

The most frequent form of mutism, which may be partial or complete, is that arising from congenital or early deafness. See Deaf-mutism. Mutism may also be the result of serious mental defect or disorder (idiocy), of mental stupor, of a delusional insanity in which the patient for some insane reason refuses to speak. Hysterical mutism, like

hysterical aphonia, is of that special type peculiar to hysterical disturbances. See HYSTERIA. Mutism of an allied nature is also symptomatic of the disease KATATONIA (q.v.). (J.J.)

Mutuality [Lat. *mutuus*, from *mutare*, to change]: Ger. *Gegenseitigkeit*; Fr. *mutualité, échange mutuel*; Ital. *mutuazione*. Double relation of give and take, in which the two relations are identical. (J.M.B.)

Myelitis (chiefly in combination) [Gr. μυελός, marrow]: Ger. *Rückenmarksentzündung, Myelitis*; Fr. *myélite*; Ital. *mielite*. A diseased condition of the spinal cord.

Leucomyelitis is a diseased condition of the white or fibrous matter of the cord. Primary lesions of the white column consist in destruction of the nerve fibres and simultaneous increase of the neuroglia. The medullary sheaths are the first to be affected. Granular corpuscles collect in the lymph-spaces about the blood-vessels. The so-called crossed pyramidal tracts are most frequently affected with sclerosis. Secondary degenerations in the cord also result from injuries to the motor areas of the cortex and the basal centres. Cf. DEGENERATION. Poliomyelitis, or degenerative atrophy of the anterior cornea, occurs as 'infantile paralysis' and 'chronic anterior poliomyelitis' in adults. The last named is very obscure. (H.H.)

Myo- (in compounds) [Gr. μῦς, muscle]: the same in other languages. Muscle (in compounds or expressions); as myograph, an instrument for recording the contraction of a muscle. (J.M.B.)

Myograph: see MYO-, and LABORATORY AND APPARATUS, III, A.

Myopia [Gr. μύειν, to close, + ὤψ, the eye]: Ger. *Kurzsichtigkeit*; Fr. *myopie*; Ital. *miopia*. Near-sightedness; short-sightedness, hypometropia, brachymetropia; the condition of an eye in which, with relaxed accommodation, parallel rays of light are brought to a focus before they reach the retina.

Its most frequent cause is an abnormal elongation of the antero-posterior axis of the eye-ball, and it may then be termed axial; it may also be due to excessive convexity of the refracting media (myopia of curvature) or to an excessive index or amount of refraction of the dioptric constants (index myopia). In myopia the rays of light are dispersed on the retina, and the confused images which thus result must be corrected by the use of concave lenses of suitable strength. The statistics and causes of myopia furnish an important topic in discussion of the hygiene of vision in the school-room and elsewhere. The opposite of myopia is HYPERMETROPIA (q.v.); both are forms of Ametropia as opposed to Emmetropia. See also VISION (defects of), and PRESBYOPIA.

Literature: J. S. WELLS, Dis. of the Eye (Amer. ed., 1883), 629; NORRIS and OLIVER, Syst. Dis. of the Eye. (J.J.)

Mysteries [Gr. μυστήριον, secret doctrine or rite]: Ger. *Mysterien*; Fr. *mystères*; Ital. *misteri*. Those rites of the ancient Greek religions which were concealed from the view of the public and practised only by persons who had been solemnly initiated and set apart for that service.

In Christian theology, hidden truths that have been brought to light through divine revelation; or the Sacraments of the Church, particularly the Eucharist. (A.T.O.)

Mysticism [Gr. μυστικός, belonging to secret rites]: Ger. *Mystik, Mysticismus*; Fr. *mystique, mysticisme*; Ital. *misticismo*. Those forms of speculative and religious thought which profess to attain an immediate apprehension of the divine essence or the ultimate ground of existence.

Mysticism springs most frequently from the religious desire for an intimate communion with God, when this is allied with a temperament of speculative boldness. But whereas ordinary religion realizes such communion in the life of ethical endeavour and aspiration, the practical element in religion is overmastered in the mystic by the metaphysical. Penetrated by the thought of the ultimate unity of all existence, and impatient of even a seeming separation from the creative source of things, mysticism succumbs to a species of metaphysical fascination. Its ideal becomes that of passive contemplation, in which the distinctions of individuality disappear, and the finite spirit achieves, as it were, utter union or identity with the Being of beings. As this goal cannot be reached under the conditions of relation and distinction which ordinary human thought imposes, mysticism asserts the existence of a supra-rational experience in which this union is realized. Such is the intuition or ecstasy or mystical swoon of the Eastern mystics, the mystical or metaphysical love (ἔρως) of the Neo-Platonists, and 'gifts' of the mediaeval saints. Bonaventura speaks of the 'apex mentis' or 'scintilla,' and Meister Eckhart of the 'Fünklein' or spark, as the faculty by which the mystical union is attained. In a more purely speculative form,

a similar appeal to a 'higher' faculty or mode of apprehension is made by Schelling in his theory of intellectual intuition; and Schopenhauer describes in similar terms the vision of the Platonic ideas in which he conceives the mind to achieve its emancipation from the evils of finitude and the sway of the irrational will. In both these cases, however, the inspiration is drawn from the aesthetic rather than the religious sphere.

The element of truth in mysticism is its keen realization of the metaphysical unity of existence, and, in particular, of the intimacy of the relation between the finite spirit and the infinite. Intense religious feeling tends to be tinged with mysticism; and historically, both in philosophy and in religion, mysticism frequently appears as a protest against mechanical, external, or anthropomorphic fashions of representing the divine and its relations to man and the world. But in its impatience of separation it overleaps the conditions of thought altogether, and in its reaction against anthropomorphism it neglects the element of relativity which must enter into all human conceptions of the absolute. A union so immediate that the distinction of subject and object disappears involves the suppression or absorption of the conscious person; the mystics themselves describe 'the ecstasy' in terms which leave it indistinguishable from a lapse into unconsciousness. Mysticism becomes, in fact, the victim of sensuous metaphor applied to supersensuous or spiritual experience, and treats the relation of ethical harmony and dependence between the divine and the human spirit as if it were one of chemical fusion or interpenetration of substances. Moreover, in its attempt to transcend the bounds of reason and to exalt the divine above all anthropomorphic predicates, mysticism leaves us, as in Neo-Platonism, with the empty abstraction of the nameless and supra-essential One—the One which transcends both knowledge and existence (ἐπέκεινα τῆς οὐσίας). We reach a truer and more adequate account of the absolute when, with a justifiable and inevitable anthropomorphism, we interpret its nature according to the highest categories of our own experience. As Cousin has well said: 'The true union of the soul with God takes place through virtue and truth. Every other union is a chimera, a peril, sometimes a crime. It is not permitted to man to abdicate under any pretext what makes him man and renders him capable of understanding God and expressing in himself an imperfect image of him, that is to say, reason, will, consciousness.'

Mysticism is sometimes used, by writers of an empirical or positivistic bias, as a dyslogistic term or opprobrious epithet, and is apparently extended to cover any system of so-called 'transcendental' philosophy, which accepts other data than sensation and association. So it appears to be used by Mill (*Logic*, Bk. V. chap. iii. § 4), where he introduces it under the head of '*a priori* fallacy or natural prejudice.' In a somewhat similar sense, but with an intention to commend, it is applied by a writer like Carlyle to any philosophy which does not limit itself to the world of 'the visible' and 'our logical mensurative faculty' (cf. the *Essay on the State of German Literature*, and *Sartor Resartus*, iii. 3). Such a usage is, however, quite inexact.

In defining mysticism some reference has already been made to its historical appearances. In India the Brahmanic pantheism has always lent itself to a mystical asceticism. In Western thought mysticism appeared in the Orphic-Pythagorean sects (cf. Rohde, *Psyche*). The theosophical speculation of Plotinus and other Neo-Platonists—foreshadowed in the so-called Neo-Pythagoreans, and, to some extent, in the contemplative asceticism of the Essenes and in Philo Judaeus—culminates in the idea of mystical union with the utterly transcendent One. Ecstasy, coalescence, contact (ἔκστασις, ἁπλωσις, ἁφή) are some of the terms used by Plotinus to describe this union (*Enneads*, vi. 9. 8–9). The speculative mysticism of Neo-Platonism was transfused into Christian thought through the literary forgeries of the Pseudo-Dionysius. Dionysius was translated into Latin by Scotus Erigena, who adopts his 'negative theology' and the idea of God as exalted above all predicates, and therefore, 'on account of his pre-eminence, not improperly called Nothing.' Religious mysticism first appears in the mediaeval Church in Bernard of Clairvaux, as a protest against the dialectical spirit of Abelard. It was cultivated by the Victorines and also by various heretical sects. The greatest of the mediaeval mystics was Meister Eckhart, among whose followers are reckoned Heinrich Suso, Johann Tauler, and the anonymous author of the *Deutsche Theologie*. The mysticism of Ruysbroeck in the Netherlands was less speculative in character. Nicolaus of Cusa teaches a species of intellectual intuition which he describes as 'comprehensio incomprehensibilis.' Boehme's system of theosophy

is one of the chief monuments of mystical thought. In the field of modern philosophy, mysticism is represented in the 17th century by the Cambridge Platonists, especially Henry More. Some of the phases of Schelling's thought are strongly tinged with mysticism; and thinkers like Novalis, Carlyle, and Emerson, whose philosophical tenets are reached by vivid insight rather than by 'the labour of the notion,' often exhibit a mystical tendency. Swedenborg, on the other hand, though treated by Emerson in his *Representative Men* as the typical mystic, has few of the traits of speculative and religious mysticism, strictly understood. (A.S.P.P.)

The word is used also in recent discussion for the pursuit of the occult, in psychical appearances, spiritualism, and the various forms of magic. The spread of irreligious views, i.e. the decline of the recognition of the supernatural, properly characterized as religious, induces various mystical substitutes for it. Höffding (*Hist. of Mod. Philos.*, Eng. trans., ii. 328 ff.) cites the mysticism of Comte; Guyau (*Non-religion of the Future*) dwells upon the 'recrudescence of faith'; Renan sublimates religion in a form of poetic mysticism; the rise of various 'isms' and 'ologies,' such as 'Christian Science,' 'metaphysical healing,' &c., especially in 'free-thought' communities, bears witness to the vitality of a broadly-defined mystic consciousness (cf. Münsterberg, *Psychol. and Life*, 'Mysticism'). (J.M.B.)

Literature: besides the numerous accounts of NEO-PLATONISM (q.v.), reference may be made to NOACK, Die christl. Mystik des Mittelalters; PREYER, Gesch. d. deutschen Mystik; COUSIN, Hist. de la Philos. moderne, tom. ii, leçon 9. Also RÉCÉJAC, Basis of the Mystic Knowledge (Eng. trans., 1899); TROILO, Il Misticismo moderno (1899); DELACROIX, Mysticisme spéculatif en Allemagne (1900); ORMOND, Foundations of Knowledge, Pt. III. chap. ix. (A.S.P.P.–E.M.)

Myth [Gr. *μῦθος*, word, legend]: Ger. *Mythe*; Fr. *mythe*; Ital. *mito*. A story, the spontaneous product of a primitive unreflecting and uncritical consciousness, in which the forces of nature or other agents are represented in personal or quasi-personal forms, and as performing supernatural or superhuman actions.

A myth is to be distinguished from a legend whose subject is, as a rule, some human being rather than a force of nature. It differs from a fable or parable in being direct and spontaneous, having in it no element of reflection or external design. In an abusive sense the term has become a synonym for pure fiction, although the author of a myth is not conscious of producing a fictitious representation.

Literature: see MYTHOLOGY. (A.T.O.)

Mythical Theory: Ger. *Mythentheorie*; Fr. *théorie mythique*; Ital. *teoria mitologica*. The special designation of the method of Strauss and his followers in explaining the supernatural elements in the story of Jesus as myths or products of the mytho-poetic faculty.

Strauss, in his *Leben Jesu*, starts by recognizing the fact of the human life of Jesus. The supernatural elements arose, he maintains, out of the expectation among the Jews that their Messiah would perform miracles and supernatural actions. Out of this the supernatural elements spontaneously originated in the imagination of the disciples. Strauss maintains that while these myths are fictitious as elements of the historic life of Jesus, they nevertheless represent abstract truths regarding humanity as a whole.

Literature: D. STRAUSS, Leben Jesu (1833); P. SCHAFF, The Person of Christ (1883); G. P. FISHER, Essays on the Supernatural Origin of Christianity (1866). (A.T.O.)

Mythology [Gr. *μυθολογία*]: Ger. *Mythologie*; Fr. *mythologie*; Ital. *mitologia*. Either the body of myths which embody the primitive religious conceptions of a people or race, or the investigation of mythic materials, in order to reduce them to scientific form.

The first reflective treatment of the myth arose among the early Greek thinkers as an effort to develop from it a more rational explanation of the world. This attempt was the parent of both science and philosophy. It was only in modern times and in the present century that the science of mythology originated in a comparative study of the myths of all nations. The most important recent controversy that has developed in this field is that between the philologists led by Max Müller and certain anthropologists whose champion is Andrew Lang, on the issue raised by Max Müller's claim that mythology is a disease of language.

Literature: TYLOR, Primitive Culture; MAX MÜLLER, Oxford Essays (1856); ANDREW LANG, art. Mythology, in Encyc. Brit. (9th ed.); Custom and Myth; and Myth and Ritual and Religion; H. SPENCER, Princ. of Sociol.; SAUSSURE, Lehrb. d. Religionsgesch. (Freiburg, 1887–9); VIGNOLI, Myth and Science (Eng. trans., 1882).

N

Naïve [Lat. *nativus*, native, natural]: Ger. *naiv*; Fr. *naïf, naïve*; Ital. *semplice, ingenuo*. Unreflective, unaffected; the naïve is 'a child-like ingenuousness which is encountered where it is not expected' (Schiller).

Applied in a specifically aesthetic use by Schiller to ancient poetry in contrast with the more reflective modern poetry. This latter he styles 'sentimental,' as making direct appeal to feeling and setting forth conspicuously the feelings of the poet himself. 'The ancients felt naturally; we feel what is natural' (i. e. feel our separation from the natural and make the natural the conscious object of sentiment).

Literature: Schiller, On Naïve and Sentimental Poetry, in Essays Aesthetical and Philosophical. (J.H.T.)

Naïve Realism: see Natural Realism.

Name [AS. *nama*]: Ger. *Name*; Fr. *nom*; Ital. *nome*. A verbal symbol applied to an object.

The function of naming seems, apart from its use for social communication by means of language, to have the utility of affording a system of symbols which abbreviate and sum up experience, and so serve, in Bacon's phrase, as 'counters of the mind.' See Name (in logic), and Symbolic Function; and cf. Language Function. (J.M.B., G.F.S.)

Name (in logic). Two quite different sorts of terms are called in logic names. A *proper name* serves to call to mind an individual object of experience well known both to the speaker and hearer (for if the object is not known to the hearer it is only just beginning to fulfil for him the function of a proper name), and to show that it is that object concerning which information is furnished or desired. Many proper names are names of collective individuals; and a few are grammatically plural, as the Gracchi. A common name, usually now called a *class-name* in logic, though common name is better, has a *signification* as well as a denotation. That is to say, it conveys the idea that whatever it may be that is spoken of, it is of a certain indicated general description, which may be in some sense negative.

Abstract names are common names of fictitious objects which correspond to predicates. At first sight they appear to be mere convenient superfluities; for to say that opium has a soporific virtue, is precisely the same thing as to say that opium puts people to sleep. But closer examination shows that abstract words enable us to express relations which could not otherwise be expressed. A relation is something true of a set of objects. But abstractions enable us to express a fact true of a set of *sets of objects*. Every collective name is an abstract name; and it would be a want of discrimination to say that numbers are superfluities. Moreover, when we see what the true nature of abstract names is, we must confess that their objects may be just as real as the objects of concrete names. They are fictitious only in the sense of having been made up out of concrete names. An abstract name may be regarded as the name of a fictitious individual; and when this individual is perfectly indescribable, like the quality of a simple sensation, the abstract name may perhaps be more like a proper name than like a common name.

Names are divided into names of first imposition and names of second imposition, which latter are names applicable to words, as

pronoun, conjunction, &c. The precise definition is given by Ockham, *Logica*, Pars I, cap. xi. Names are also divided into names of first and of second intention. See TERM. (C.S.P.)

Narcosis [Gr. *νάρκωσις*, a benumbing]: Ger. *Betäubung, Narkose*; Fr. *narcose*; Ital. *narcosi*. Lessening or complete deadening of sensibility to pain by means of a narcotic agent, as opium, morphine, chloral hydrate. See NARCOTICS. (C.F.H.)

Narcotics [Gr. *ναρκωτικός*, making stiff or numb]: Ger. *Narkotika*; Fr. *narcotiques*; Ital. *narcotici*. A substance which induces sleep and in large doses insensibility and stupor.

The tendency is to use the term narcotics to include all substances having a marked influence on the nervous system, thus including the sedatives, the hypnotics or soporifics, those which, like curari, produce immobility by paralysing the nerve-endings, and such substances as strychnine, digitalis, &c. Narcotic in the more special sense refers to an intense hypnotic. Among narcotics, sometimes termed direct narcotics, may be mentioned opium, morphine, cannabis indica. Cf. PSYCHIC EFFECTS OF DRUGS. (J.J.)

'Narcotics are substances which lessen our relationships with the external world' (T. L. Brunton).

Narcotic is a word rapidly giving place in scientific uses to terms of more exact signification, such as anaesthetic, analgesic, hypnotic, somnifacient, and delirifacient (H. C. Wood). Great confusion also exists at present as to the proper classification of the various substances. (C.F.H.)

Nascent [Lat. *nascere*, to be born]: Ger. *anfangend, wachsend* (*steigende Vorstellung*, Herbart—K.G.); Fr. *naissant*; Ital. *nascente*. Germinal: applied to a developing thing or psychological state before it reveals its positive character.

The term incipient is used with a similar meaning, but the emphasis is rather on the undeveloped than on the hidden character of what is incipient.

Nascent was more in use (e. g. by Spencer) before the rise of the theory of the SUBCONSCIOUS (q. v.). The postulate of 'nascent' psychological states was especially convenient in association theories in cases where clear and positive psychological elements could not be discovered (cf. James' criticism of Spencer in *Princ. of Psychol.*, i. 148 ff.). Writers of other schools find equal convenience in the use of the terms implicit and potential. (J.M.B.—G.F.S.)

National Wealth: Ger. *Nationalvermögen*; Fr. *richesse des nations*; Ital. *ricchezza nazionale*. (1) Measured as a 'fund' (capital), the amount of useful things existing in a country at a given time. (2) Measured as a 'flow' (income), the goods produced and services rendered during a given period. (3) Popular, the money value of (1).

Also called public or social wealth; distinguished from property, which consists of rights or titles to parts of national wealth.

We must beware of confounding public wealth with public property. Waterworks and railroads owned by private companies are just as much part of the national wealth as municipal waterworks or national railroads.

We must also beware of treating an increase or diminution of private property at any point as clearly indicating a corresponding change in national wealth. If a useful article becomes abundant, it means a great increase in national wealth; but the price of the article in question may fall as fast as the abundance increases, and leave no apparent effect on private wealth. (A.T.H.)

Nationality [Lat. *nationalis*, pertaining to birth]: Ger. *Nationalität, Volksthum*; Fr. *nationalité*; Ital. *carattere nazionale*. The term expresses properly the quality of being a nation or belonging to a nation; it is improperly used as the equivalent of nation.

It is not easy to say what constitutes a nation, although a common language and the belief, at least, in a common origin seem to be the most essential elements in nationality. To occupy, or rather to have occupied, at some period of history, a common territory seems only a less important requisite. A common national character and common institutions have often been produced by community of race, language, and territory, and have in turn deepened nationality. Some of the best known nations fulfil very imperfectly these conditions. The inhabitants of the United States are a nation; but although they occupy a common territory and speak a common language, they are of different descents. The Scottish nation is made up of two peoples very different in their origin, which down to quite recent times spoke totally distinct languages. The Swiss nation is made up out of fragments of the German nation, of the Italian nation, and of a Romance population akin to the French, each speaking its own language and notoriously of different origins. The Belgian nation is similarly composed of Flemings and Walloons. In these cases unity of territory,

unity of political institutions, and unity of patriotic feeling serve to constitute an artificial nationality. On the other hand, the Hebrews, who for many centuries past have not inhabited the same territory or been subject to the same government, and who have learnt to speak many alien tongues, still constitute a nation bound together partly by common descent, but much more by a religion of the antique tribal type. Thus we see that nationality is not merely an affair of race or of language, or of a common territory, or of common political institutions, or of common civilization, but depends in different cases more or less upon each or some of these unifying circumstances. Indeed, any large mass of human beings which feels itself to be one for any great purpose not merely spiritual is on the way to become a nation. Down to the time when Christianity was first preached, most religions had been national and had tended to strengthen nationality, but Christianity, and after it Mohammedanism, appealed to mankind at large. In the 19th century it was often laid down that every nation ought to enjoy political independence, but this feeling is very recent. In the ancient world the political unit was not the nation, but the city, canton, or tribe. In the mediaeval world states were based not on nationality, but on the principles of feudal law. In modern times the stronger and better organized nations have subjugated and sometimes absorbed their weaker neighbours. The Socialists very generally decry nationality and propose to found political institutions on a totally different basis. Surveying history as a whole, we cannot say that either political unity and independence, or even the conscious wish for them, is essential to nationality. (F.C.M.)

Nativism [Lat. *natus*, from *nasci*, to be born]: Ger. *Nativismus*; Fr. *nativisme*; Ital. *nativismo*. The theory according to which, in the several departments in which it is advocated, this or that is native, inherent, or constitutional. See the next topic.

Cf. A PRIORI, KANTIANISM, INNATE IDEAS, and INTUITION (nativism of knowledge); EXTENSION, SPACE, and TIME (nativism of space and time); ACQUIRED AND CONGENITAL CHARACTERS, and CONNATE (nativism in biology). (J.M.B.)

Nativism (1) and (2) **Empiricism** (in epistemology): for foreign equivalents see the separate topics. (1) Nativism seems to be a convenient name for the common theory that certain assignable parts of our knowledge are caused by mental properties which are connate with every mind and the same in all.

This theory has generally been held in opposition to the theory that all our knowledge is due to or caused by experience, but it is in reality only one of several alternatives which might be opposed to that theory. Thus it is no mark of nativism to hold: (i) the generally admitted theory that the knowledge of any individual mind is not wholly due to its own experience, and is therefore partly caused by its native constitution; (ii) that the native constitution of any individual mind is not wholly or even at all due to the inherited results of its ancestors' experience, but partly or wholly to what is called accidental variation or to other unknown causes not included under that description; (iii) that all knowledge, including experience itself, is partly caused by such a native constitution.

It is essential, however, to nativism proper that it should hold, in distinction from (ii), that either every mind or every human mind has some native properties, which are the same in all, and cannot therefore have been gradually acquired by the successive action of various causes; and in distinction from (iii) that part of our knowledge can be distinguished as in no degree caused by the native properties which it asserts to be the cause of another part. The part of our knowledge which it thus asserts to be due to the native constitution of our minds is our knowledge of necessary truths, and the part which it asserts to be in no degree due to the same cause consists of sense impressions or perceptions (see *Empiricism*, below).

Thus understood, the term will obviously apply to the well-known 'theory of innate ideas'; and perhaps it may also properly include Kant's transcendentalism, although it may be contended that, according to this theory, the universal properties of mind, to which knowledge is partly due, do not exist in time, and cannot therefore be properly said to be native or congenital. However that may be, transcendentalism and nativism have in common this difficulty, that they allow sense-impressions to be the necessary occasion even for the knowing of those truths, the knowledge of which they assert to be due to the native or essential constitution of the mind. This admission would seem to imply that the native or essential constitution of the mind is not the sole cause of any cognition whatever, but that its joint action with

sense-impressions is necessary for the production of our knowledge of necessary truths, whereas that part of our knowledge which consists in or is produced by sense-impressions is entirely independent of its action.

It must be admitted, however, that the supporters of both doctrines do not seem generally to have recognized this as a consequence of their admission. They seem to wish to maintain that there is something in our knowledge of necessary truths which is *solely* due to the constitution of the mind and entirely independent of the action of sense-impressions. Their theory would seem to be that the occurrence of sense-impressions is only necessary to make us conscious of something of which the complete cause was present in the mind before their occurrence. Thus the 'theory of innate ideas' seems to hold this complete cause to consist in the 'idea' of that truth whereof we afterwards become conscious. Against this view it must be urged that our consciousness of anything is not divisible into two distinct parts: (*a*) the mere being-conscious, (*b*) that which distinguishes this instance of consciousness from another, such that the one part might have one cause and the other a totally different one. Some particular consciousness and not mere consciousness is the smallest mental element for which a distinct cause can be assigned; nor do the supporters of either doctrine expressly deny this. If, therefore, we are to say that there is something in the consciousness of necessary truths, in the production of which sense-impressions do not in any way co-operate, this can only be the truth itself. This certainly cannot be in any way due to the occurrence of sense-impressions, since it is not a thing which exists at any particular moment of time. But then, for the same reason, it can have no cause at all.

There seems good evidence, however, that it is the nature of necessary truths themselves which makes the supporters of nativism and transcendentalism anxious to maintain that there is something in our knowledge of them entirely independent of the influence of sense-impressions. Both doctrines, in fact, strenuously maintain that necessary truths are *logically* independent of sense-impressions, and both frequently fail to distinguish this contention from that by which they are to be defined, namely, that our knowledge of necessary truths is *causally* independent of sense-impressions; that is, both contentions remain undistinguished in the usual form in which their common creed is expressed: 'necessary knowledge is independent of experience or *a priori*.' The definition of nativism is, then, perhaps best completed by the proviso that 'parts of our knowledge' is sometimes to be understood as equivalent to 'some of the truths which we know.'

(2) EMPIRICISM (q.v., 2) is a term in much more common use, and would seem to be best defined (*a*) as a characteristic of some philosophical disquisitions consisting in the fact that their arguments and conclusions largely presuppose the principle that all known truths assert something about what exists at one or more moments of time.

(*b*) The definition in Webster's *English Dictionary* (ed. 1891)—'The philosophical theory which attributes the origin of all our knowledge to experience'—is, however, commoner. Cf. EMPIRICISM (1).

To definition (*b*) it may be objected (i) that empiricism is not a theory, because there would seem to be no one express principle or combination of principles which is enunciated by all empiricists and rejected by all other philosophers. An empiricist is recognized rather by the general character of his arguments and conclusions than by any principle from which he professes to deduce them. (ii) That this general character consists in the fact that his arguments or conclusions, very various in other respects, exhibit the constant influence of some principle, of which he may or may not be conscious, would perhaps be generally admitted. But a principle can only be said to influence arguments and conclusions where there is either an actual or an apparent logical relation between them and it. But even where one proposition only *appears* to have a logical relation to another, it really has this relation to some other proposition which may be easily confused with that to which it appears related; and further, in a continuous philosophical disquisition, not only that which appears to have this relation, but also that which really has it, will in general be expressly stated. It may, therefore, be fairly assumed that wherever philosophic reasoning is influenced by a principle, this principle will be actually presupposed by many of the propositions occurring in its course. (iii) That empirical reasonings can only be defined by the fact that they *largely* presuppose a certain principle, is due to the fact that they always also presuppose others contradictory of this one, and that they do not at all points presuppose this. Thus an empiricist can only

be distinguished from other classes of philosophers by the degree of frequency with which this presupposition occurs. (iv) That the principle, by the presupposition of which empiricism must be defined, is not 'that experience is the origin of all our knowledge,' needs longer discussion. This principle would, indeed, be commonly held to characterize empiricism, either as presupposition or as theory. Objection must, however, be taken to it in the first place on the ground of its ambiguity. 'Experience' would be admitted by all to be an ambiguous word; and the words 'origin' and 'knowledge' involve the twofold ambiguity, pointed out in the definition of nativism, as to whether 'cause' or 'logical premise' be meant by the one, mental state or that which is known by the other. When, however, all ambiguity is removed, it will be found that the only part of its meaning which will really serve to characterize empiricism is the principle given in the definition first given.

History. (1) *Nativism.* The early Greek philosophers, notably Heraclitus, had already made that distinction between truths of reason (λόγος) and truths of sense (αἴσθησις) which was ultimately to be connected with nativism; but they seem to have seen no reason to assign a different origin to the knowledge of these different kinds of truth. Their theory of the origin of knowledge was that the mind (generally conceived as material) and the object always co-operated in producing it; and they attributed to the mind no greater share in producing the one kind than the other. Protagoras and the Sophists, however, used this theory in order to draw sceptical consequences; and Plato, while he seems to have accepted both it and these consequences with regard to sensation, was therefore bound to give some other account of the origin of true knowledge (ἐπιστήμη νοητῶν), which it was his main aim to vindicate against scepticism. Hence his famous theory of ἀνάμνησις, viz. that our knowledge of necessary truths or 'ideas' is a remembrance of truths learnt by the soul before birth—a remembrance which is excited by sensations, but which, since its objects are not temporary, cannot be caused in the same way. It is, however, doubtful how far he himself intended this theory to be allegorical, since he always concerned himself rather with the truth of necessary knowledge and its intrinsic difference from sense-knowledge than with its origin. In Aristotle, speculations as to the origin of knowledge are even less prominent; but there seems to be no doubt that he seriously held the view that every man was endowed from his birth with a reasoning faculty, which was the same in all men, and was the source and potentiality (δύναμις) of abstract knowledge, although it required the stimulation of sense to actualize this knowledge. It is from the Stoics that the word 'innate' (ἔμφυτος, innatus), as applied to truths, seems to be derived. They seem to have applied it to truths of reason (especially to moral principles), and they undoubtedly held that we were only able to know this kind of truths, owing to the immanence in us of the universal reason; but in harmony with their materialistic conceptions of reason, they seem to have thought that truths of this kind were logically identical with sensible truths, and hence they seem to have regarded the innate *logos* not even, like Aristotle, as a virtual knowledge of truths different from those of sense, but merely as a power of recognizing what was given in sense. Nevertheless, their doctrine, through its extreme popularity and adoption by the Romans, seems to have been the chief means of perpetuating a nativistic theory of rational knowledge. In the middle ages, again, interest was centred rather upon the nature of what is known than upon the causes of our knowing it. The realists, however, who contended for the separate reality of universals as something different from sensible objects, always tended to defend nativistic doctrines against the nominalists, who, adopting the view which Aristotle opposed to Plato, that the universal is real only *in* the particular, unintentionally went very much further than Aristotle in maintaining as his doctrine 'Nihil esse in intellectu, quod non prius fuerit in sensu.' In modern philosophy nativistic theories of the origin of necessary knowledge were strongly held by Descartes and by Leibnitz; the latter, especially, in opposition to Locke, gives to the theory far greater precision than it had hitherto possessed. Kant differs from him chiefly in supposing that the innate cause of necessary knowledge does not *resemble* that knowledge itself, and the great influence of his theory in this respect finally put an end to the doctrine of 'innate ideas' as such. It was only in the latter half of the 19th century that the question of nativism was connected with that of inheritance. It had never before been clearly recognized that the knowledge of a single individual, even if entirely attributable

to experience, could certainly not be attributed solely to his own. But, this once recognized, the doctrine that it could be attributed to the inherited results of ancestral experiences was seen to be inconsistent with the famous theory of Weismann that no acquired characteristics can be inherited. Accordingly there arose a new division between theories of the origin of knowledge, according as Weismann's view was adopted or denied, and it is mainly in connection with this question that the term 'nativism' has been used.

(2) *Empiricism.* In the sense defined it is plain that all the early Greek philosophers, with the possible exception of the Eleatics, were empiricists. But that there was possible in philosophy that kind of difference in principle, which is vaguely denoted by the term empiricism, was first recognized by Plato, in consequence of the irreconcilable differences of Socrates and the Sophists, which were not, like the differences of earlier philosophers, capable of being specified as differences of opinion as to what existed, but seemed to proceed from something which was equally compatible both with agreement and with difference on such points. Plato uses the word *ἐμπειρία* to denote that way of acquiring knowledge, as to a thing's effects, which consists in frequent use of the thing—a sense more closely analogous to that preserved in the word 'empiric' than to that of the philosophical term 'empiricism.' He opposes it to *λογισμός*; and the knowledge thus acquired to *ἐπιστήμη*. But his term for 'experience,' in the sense above defined, is rather *αἴσθησις*; *ἐμπειρία* denoting the manner in which experience gives rise to other knowledge, without the intervention of inference. Much the same use of terms is continued by Aristotle, but in him it has not the same importance as a method of classifying philosophies. The Stoics are a good instance of non-empirical philosophers, who nevertheless appear to have expressly held the theory generally taken to be characteristic of empiricism: they recognized constantly truths different from objects of experience, without recognizing that these truths were thus different. The Epicureans, on the other hand, were both actual and avowed empiricists. From the extinction of the Epicurean school till the close of the middle ages there was no empirical philosophy. The nominalist Schoolmen, as has been said, sometimes avowed a principle similar to that of empiricism; but just as they falsely thought this principle was held by Aristotle, so they agreed with him in many respects in which he is very far from empirical. Bacon, in pleading the cause of experimental inquiry, could not but avow empirical tenets; but his philosophy, so far as he has any, cannot be classed as empirical. Hobbes is probably the first noted empirical philosopher of modern Europe; but in the history of empiricism the influence of Locke is far more important. He not only definitely avows, but continually implies the principle, that all the knowledge of every individual is caused by the action of objects upon his mind; and though he admits that we have some necessary knowledge, it is only such as he could easily believe to be analytical. The theory that objects cause our knowledge of them was expressly given up by Berkeley and by Hume; but they did not cease to imply it; and both their avowed and their implied views of necessary truths are the same as that of Locke. It was Kant who, by his recognition of necessary synthetic truths, first brought into prominence the necessary distinction between the causal and the logical origin of knowledge: accordingly it is since his time that the term empiricism has been most commonly and significantly used in the classification of philosophers, although never yet with a clear recognition that the sole basis of the classification is the logical and not the causal question. English philosophy has continued to be empirical during the greater part of the century; but owing to the influence of Kant's proof that some necessary truths, particularly the law of causation, are synthetic, the interpretation of them as universal has been more commonly adopted by empiricists, especially by J. S. Mill. At the same time, while it is generally held that experience is due to the action of objects upon our minds, the theory that the constitution of our minds has no influence upon the character of our knowledge has been generally seen to be absurd.

Literature: Plato, Meno, Phaedo, Theaetetus; Aristotle, De Anima; Zeller, Stoics; Leibnitz, New Essays; Locke, Essay on the Human Understanding; Kant, Krit. d. reinen Vernunft; J. S. Mill, Logic; W. James, Princ. of Psychol., chap. xxviii. (G.E.M.)

Nativity [Lat. *nativitas*, birth]: Ger. *Nativität*; Fr. *nativité*; Ital. *natività*. The doctrine of the birth of Christ, including its time, mode, and commemoration.

The birth of Christ occurred probably four years prior to the date fixed by current chronology. The season of the year is con-

jectural. According to the Scriptural account and the belief of the Church the conception of Christ was miraculous. Early in the history of the Church the doctrine of the Immaculate Conception was broached, and became a subject of controversy throughout the middle and later centuries of church history, being finally promulgated as the accepted doctrine of the Roman Catholic Church in 1854 by a bull of Pius IX. The date of Christmas, the official commemoration of the Nativity, was fixed by the Romish Church on evidence that at best yields only a degree of probability.

Literature: see JESUS CHRIST, and ADVENT. (A.T.O.)

Natura naturans, and **Natura naturata:** see NATURE.

Natura non facit saltum [Lat.]. 'Nature makes no leaps': the principle of continuity or uniformity of natural operations. Cf. UNIFORMITARIANISM.

The principle has new meaning in view of the theory of EVOLUTION (q. v.). (J.M.B.)

Natural [Lat. *naturalis*]: Ger. *natürlich*; Fr. *naturel*; Ital. *naturale*. In accordance with, belonging to, or derived from nature.

While the term is derived from and associated, philosophically as well as etymologically, with the term NATURE (q. v.), it has selected especially one side of the meaning of that term, namely, that which is in accordance with the course of events, that which is regular, stated, and usual. The sense of physical has thus dropped into the background, though still apparent in such phrases as natural science and natural philosophy. A double meaning, that is, a higher and a lower sense, corresponding to similar connotations of nature, still persists, however, in its ethical implication. (1) On one side, that which is regular and uniform is that which is to be expected; it is the normal, that from which as a standard all departures are measured, and is opposed to the artificial as the purely factitious and strained. As norm, the word gets a highly ideal import, often being the highest term of commendation, as in popular aesthetic judgment of a picture, or in social intercourse, in judgment of a personality. (2) In its theological use, however, it is identified with the carnal, base, or worldly—thus the term 'natural man' in the writings of St. Paul, and through him in theology generally. (3) In a midway or neutral sense the term natural is simply opposed to that which is supernatural or revealed, and then may be further supplied with a good or bad sense, according to the disposition of the writer—as natural religion, natural theology. (4) It is also defined as that which belongs to men, by and from birth, as opposed to which has been acquired historically or conferred by political authority—as NATURAL RIGHTS (q. v.) distinguished from POSITIVE RIGHTS (q. v.). (J.D.)

Natural Dualism: see NATURAL REALISM.

Natural History: Ger. (1) *Naturwissenschaft* (wider than natural history), (2) *Naturgeschichte*; Fr. *histoire naturelle*; Ital. *storia naturale*. (1) Description of the objects found in terrestrial nature. The term is still used as a convenient collective designation for physiography, geology, mineralogy, botany, zoology, and anthropology, with emphasis on the biological sciences, especially since 'history' has become illuminated by the theory of evolution. Consequently an easy transition is made to the following meaning. (2) Record or history of natural occurrences; in this sense sometimes applied to the development and evolution of mind. (C.S.M.–J.M.B.)

Natural Law: see LAW, and PRINCIPLE, and cf. SCIENCE.

Natural Law or **Law of Nature** (in political philosophy): Ger. *Naturrecht*; Fr. *loi naturelle*; Ital. *legge naturale*. (1) A law of which the precepts are not of deliberate human institution, but arise spontaneously, in the manner of instincts. (2) A law which, however it arises, is the fulfilment of implanted instincts and capacities, and is the condition or way of their development.

Most of the ambiguities attaching to the term NATURE (q. v.) attach also to the Law of Nature. The German distinction between *Naturrecht* and *Naturgesetz* is inadequately rendered by our 'principles of law' and 'enactment.' There is the further difficulty of so interpreting 'law' as to avoid the suggestion of a legislator or the analogy of the uniformities of physical science.

The most imposing use of the term was made by the Stoics. The term was revived by Grotius when he based international law on law of nature. Hobbes and Spinoza recur to the first sense more bluntly. The second is the sense in which the term and idea have been defended by Krause, Stahl, Lorimer, Ahrens, T. H. Green, and Herbert Spencer. Bentham, Lewis, and Stephen are the chief critics. (J.B.)

Literature: HERBERT SPENCER, Man *versus* the State, 87 ff.; JAS. LORIMER, Inst. of Law (1880); KRAUSE, Syst. d. Rechtsphilos.; STAHL, Philos. des Rechts; AHRENS, Cours de Droit naturel; T. H. GREEN, Works,

ii, Political Obligation; BENTHAM, Mor. and Legisl., chap. ii; CORNEWALL LEWIS, Use and Abuse of some Political Terms; LESLIE STEPHEN, English Thought in the 18th Cent.; ARDIGÒ, Sociologia. (J.B.)

Natural Realism: Ger. *natürlicher Realismus*; Fr. *réalisme naturel*; Ital. *realismo naturale*. The theory that in the fact of perception, as a veracious datum and testimony of consciousness, a knowledge both of mind and matter is indubitably given. The same as Natural Dualism. Cf. REALISM, PRESENTATIONISM (1), and COMMON SENSE.

The term is defined as used by Hamilton. See his edition of Reid, Note A, § i, and *Discussions on Philos.*, 55. (J.D.)

Such natural realism as is held by the naïve (i. e. unreflecting) or ordinary man is called 'naïve realism.' (J.M.B.)

Natural Religion: Ger. *natürliche Religion*; Fr. *religion naturelle*; Ital. *religione naturale*. Religion in so far as it may be derived from nature and reason and from the constitution of man, without the aid of supernatural revelation.

Natural stands contrasted here with supernatural and includes rational. It excludes but does not deny supernaturalism. The naturalistic theory of religion does, however, deny the supernatural, and derives all religious truth from natural sources. But natural religion does not need to occupy this exclusive ground. It may simply rest on the assumption, which all will concede, that man is either a religious being by nature or that he is capable, by the exercise of his unaided power, of apprehending certain religious ideas and of developing a religious experience.

Literature: see RELIGION, and SUPERNATURALISM; the Bridgewater Treatises; SEELEY, Nat. Religion. (A.T.O.)

Natural Rights: Ger. *Naturrechte*; Fr. *droits naturels*; Ital. *diritti naturali*. The claims founded on the law of nature.

The expression played a part in early Greek speculation among the Sophists, who appealed to natural rights as founded on natural law in the sense of elementary instincts of human nature. In Locke's writings and in the political creed of the United States and the French Revolutionaries something of the second sense of NATURAL LAW (q. v.) is mingled, and in the background (as long before with Hobbes) there is a supposed STATE OF NATURE (q. v.). (J.B.)

Natural Selection: Ger. *natürliche Auslese* (or *Züchtung*); Fr. *sélection naturelle*; Ital. *selezione naturale*. The theory that the struggle for life due to the rate of multiplication of animals and plants and to other conditions, results in the survival of those individuals having the most advantageous variations; and thus leads, by accumulation through a series of generations, to evolution. See SELECTION (in biology), and EVOLUTION; and cf. EXISTENCE (struggle for), EXCESS, PRODIGALITY OF NATURE, MALTHUSIANISM, SURVIVAL OF THE FITTEST, and VARIATION.

The two men whose names will always be associated with this great hypothesis, Charles Darwin and Alfred Russel Wallace, were led independently to the same conclusions by their memory of the *Essay on Population* by Malthus. Darwin had reflected much on evolution during the voyage of the *Beagle* (1831–6), and on his return home opened a notebook, in July, 1837, in which to record all facts bearing on the process and its possible causes. He says in his *Autobiography*: 'I soon perceived that selection was the keystone of man's success in making useful races of animals and plants. But how selection could be applied to organisms living in a state of nature remained for some time a mystery to me.' Various possible causes of change passed through his mind and were dismissed as inadequate, until, in October, 1838, he read Malthus, and the idea of the survival of favourable and the extinction of unfavourable variations at once occurred to him. In 1842 he wrote a short account of the theory, which he expanded into an essay of 231 folio pages in 1844, but continued to observe and experiment, and could not be induced by his friends to publish until on June 8, 1858, he received a manuscript essay from Wallace, who was then at Ternate in the Molucca Islands. In this essay, entitled 'On the Tendency of Varieties to depart indefinitely from the Original Type,' Darwin found a complete exposition of his own hypothesis. 'If Wallace had my manuscript sketch written out in 1842, he could not have made a better short abstract! Even his terms now stand as heads of my chapters,' he wrote to Lyell. Sir Charles Lyell and Sir Joseph Hooker, whose advice Darwin sought, decided that Wallace's essay should at once be published, but that it should be accompanied by an abstract of Darwin's own work. The joint paper was read before the Linnean Society of London, July 1, 1858, with the title, 'On the Tendency of Species to form Varieties; and on the Perpetuation of Varieties and Species by Natural

Means of Selection.' Thus the phrase 'natural selection' first came before the world.

Probably the essential difference between this and all other theories of the motive cause of evolution is the clear appreciation of the intensity of the struggle for existence as well as its significance in the origin of species. On this point the minds of the two discoverers ran in such parallel grooves that Darwin insists on the 'struggle for life,' Wallace on the 'struggle for existence.' A brief account of 'sexual selection' is included in Darwin's essay. This most memorable episode was the beginning of a life-long friendship between the two men. Wallace, like Darwin, had been convinced of the truth of evolution itself before natural selection occurred to him. The hypothesis flashed across him suddenly in Feb. 1858, when he was lying ill in bed with fever and was thinking of the 'positive checks' described by Malthus. In two hours after this he had 'thought out almost the whole of the theory,' and in three evenings had finished his essay. Darwin's chief work appeared on Nov. 24, 1859, with the exact title, *On the Origin of Species by means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life.* The whole edition of 1,250 copies was sold on the day of issue. The plan of the book is remarkable: it begins with an account of natural selection, then considers special difficulties in the way of a belief in natural selection and in evolution, and ends with the evidences for evolution. In this arrangement there is the recognition of the fact that it was hopeless to expect a belief in evolution until some intelligible motive cause had first been suggested.

It is especially noteworthy that the theory makes no attempt to explain the origin of the individual variations upon which it is based. It rests upon the demonstrable fact of their existence. Furthermore, the variations which form the material for the operation of selection are inherent and hereditary, thus differing from the 'acquired' characters or Modifications (q. v.) upon which Lamarck based his hypothesis. Although Darwin incorporated a certain element of Lamarckism (q. v.) in his conception of evolution, it formed no part of his own theory of natural selection.

Natural selection has been criticized by those who suppose that a non-useful stage is an early but essential phase in the development of every character. Thus the Duke of Argyll spoke in this sense of 'prophetic germs.' Dohrn was the first to meet this difficulty by the hypothesis of 'change of function' (Functionswechsel), in which he suggested that new organs are rarely formed *de novo*, but are produced by modification of the function and subsequently of the structure of pre-existing organs. The recent hypothesis of Organic or Indirect Selection (q. v.) also materially assists in early beginnings and transitional stages. It has furthermore been objected that the process of natural selection is necessarily so slow that geological time would have been wholly insufficient for evolution thus caused. This objection does not take into account the very different rates at which evolution by natural selection must be supposed to have proceeded when a change in the organic or geographical conditions has upset a pre-existing equilibrium between the inhabitants, animal and vegetable, of any district. In those areas upon the earth's surface where such an organic balance is, from the nature of the case, less exposed to disturbance, evolution has proceeded at a slower rate. Thus certain islands still contain the forms which have been replaced by more modern products of evolution upon the adjacent continental areas. In the greatest depths of the ocean the conditions, both organic and inorganic, have been more persistent than in any other part of the globe, and there evolution has been slowest. In the brachiopods especially we meet with forms which appear to have undergone no progressive evolution since Cambrian times. This association between persistent conditions and arrested evolution is explained by the followers of Buffon on the ground that variation is the direct effect of changed conditions, and is at its minimum when conditions are constant, while Lamarckians believe that variation is the indirect effect of the same cause through its operation as a stimulus to individual desire and effort. The convinced natural-selectionist holds that arrested evolution is not due to the absence of sufficiently large individual variation, but a natural result of the successful adaptation of a species to conditions which remain permanent, when the average fertility of the species exactly compensates for the average loss. He holds that the characters relied on by the followers of Buffon and Lamarck are 'acquired,' and incapable of hereditary transmission, and can only assist evolution indirectly by means of 'organic selection.' Cf. Acquired and Congenital Characters, and Heredity.

The natural-selectionist further holds that

such beneficial acquired modifications are themselves due to one of the highest reaches of natural selection in rendering the individual capable of an adaptive response to the stimulation provided by external conditions or its own activities. Cf. PLASTICITY.

Evolution normally proceeds from the selection of the ordinary minute differences which distinguish the individuals of a species, and which are present during a state of evolutional arrest no less than in one of rapid progress. Changed conditions lead to progress by establishing a new or a higher selective 'mean' rather than by acting directly upon the selected material. This, at least, is the conclusion to be reached by a study of the animal world.

There are, however, many facts and observations which lead to the conclusion that changed conditions may evoke hereditary variation in plants. It may well be that evolution by selection operates in two ways upon the higher groups of the vegetable kingdom, with their comparatively passive relation to environment, and the liability of species to be driven out of existence by environmental change. In the first place, there is the ordinary operation of selection upon the ever-present individual differences; in the second, the germinal constitution of such plants may have been rendered by natural selection especially sensitive to changed conditions, so that fresh hereditary material may be afforded to selection by the very changes which might otherwise have been fatal to the existence of the species.

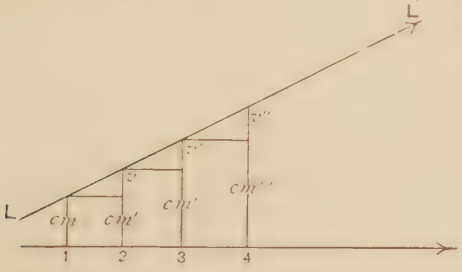
Quite apart from this special question, affecting a certain proportion of the vegetable kingdom, the character of the variational material upon which selection operates has been the subject of much difference of opinion. Darwin originally believed that large variations like those made use of in artificial selection played a part, although not a very important one, in evolution. Fleeming Jenkin's essay convinced him that their effect is nothing as compared with that of ordinary minute individual differences. The belief in large variations has been recently revived by Bateson, and has been supported by F. Galton in connection with the idea of a prepotent hereditary influence. Evolution by the selection of large variations would be discontinuous (Bateson) or transilient (Galton) as contrasted with the smooth continuous history of change dependent on the selection of minute individual differences. Under the topic MUTATION (q. v.) it is shown that the paleontological record, wherever complete, represents such a history rather than the discontinuous advance demanded by the former conception.

T. H. Huxley was never completely convinced of the efficacy of natural selection, because the domestic breeds or races produced by man, while differing in structure far more than many natural species or even genera, are still completely fertile *inter se*. Until this usual characteristic of natural species could also be reproduced by experimental selection he was unable to give more than a qualified assent to the theory of natural selection. But Darwin never believed that mutual sterility was produced by direct selection in nature, so that, if he is right, the production of mutual sterility by experiment, although most interesting in itself, would be the production of a common natural result by means which are not adopted in nature. Darwin looked on mutual sterility as an incidental rather than a direct result of species separation, and pointed out that it was most irregular in its occurrence, so that an immense number of plants considered to be true species are still perfectly fertile *inter se*. The late G. J. Romanes, in his hypothesis of PHYSIOLOGICAL SELECTION (q. v.), on the other hand, placed mutual sterility as the basis, instead of the climax, of a large amount of species formation, viz. of all cases in which interbreeding was not prevented in some other way. The fact that so many natural species can still produce hybrids, while others are even perfectly fertile when brought together, supports the Darwinian conception, and leads to the belief that our domestic breeds will need separation until some immensely remote epoch before the same incidental results can be expected to manifest themselves. If they did so now they would furnish no experimental verification of the natural condition.

The following interpretation of sterility between species is consistent with Darwin's views. The germ substances which meet in fertilization are of infinite complexity, and require the most exact adjustment the one to the other if the union is to be fertile. The adjustment is often inexact between individuals of the same species, but natural selection rigidly keeps up the standard among the individuals of a species so long as these constitute a single organic whole interbreeding together. As soon, however, as a species separates into two groups of individuals which do not interbreed, natural selection

can only keep up the standard of fertility within each group, and not between the two groups; for while unfertile unions within each group are rigidly excluded by selection, those which would have been unfertile between the two groups, but are nevertheless fertile within each group, are encouraged by selection. We witness a condition in which complete sterility between the two groups is certain to be attained after the lapse of an immense period of time in consequence of the mere cessation of selection. Cf. FERTILITY, STERILITY, and REPRODUCTIVE SELECTION. (E.B.P.)

The accompanying diagram may serve to illustrate the theory of evolution which makes exclusive use of the principle of natural selection. In its 'pure,' or Neo-Darwinian, or Weismannian form, it is contrasted with LAMARCKIANISM or ORTHOGENESIS (q. v.) and with ORTHOPLASY (q. v.). Under those terms similar diagrams are given, with which this may be compared.



Neo-Darwinism or Weismannism. LL', line of evolution; 1, 2, &c., successive generations by physical heredity; *cm*, *cm'*, &c., congenital mean; *v*, *v'*, variations (congenital). Evolution is by selection of variations added to the congenital mean from generation to generation.

Among the questions which arise in the interpretation of natural selection are: (1) In what sense is this principle a 'force' or 'motive force'? (cf. Darwin's discussion with Asa Gray, given in Poulton, *Charles Darwin*): cf. FORCE AND CONDITION, and BIONOMIC FORCES. (2) What relation does this principle sustain to others which claim to be FACTORS OF EVOLUTION (q. v.)? (3) That of the operation of natural selection in MENTAL EVOLUTION (q. v.). (J.M.B., E.B.P.)

Literature: CHARLES DARWIN, Life and Letters (London, 1887); Origin of Species; Linn. Soc. J., 1858; A. R. WALLACE, Linn. Soc. J., 1858; Tropical Nature and Natural Selection; and Darwinism; T. H. HUXLEY, Life and Letters (1900); Anonymous, Quart. Rev., art. on Huxley (Jan., 1901); E. B. POULTON, Charles Darwin and the Theory of Natural Selection (London, 1896); W. BATESON, Materials for the Study of Variation (London, 1894); FLEEMING JENKIN, North Brit. Rev., June, 1867; H. F. OSBORN, From the Greeks to Darwin (N. Y., 1894). For recent expositions see ROMANES, Darwin and after Darwin, i; CONN, The Method of Evolution (1900); HEADLEY, Problems of Evolution (1901); GROOS, The Play of Animals (Eng. Trans.); COPE, Primary Factors of Organic Evolution (Lamarckian). The authors cited under LAMARCKISM nearly all criticize natural selection. (E.B.P.–J.M.B.)

Natural Theology: Ger. *natürliche Theologie*; Fr. *théologie naturelle*; Ital. *teologia naturale*. The systematic treatment of the problems of God's existence, nature, and relations, in so far as it proceeds upon natural and unrevealed data.

The idea of natural theology is positive and proceeds on the assumed possibility of obtaining knowledge of God from the natural resources of human reason. It is opposed to agnosticism on the one hand and to the claims of an exclusive supernaturalism on the other. The science is as old as Socrates and the design argument. The earliest modern treatise on natural theology is the *Theologia Naturalis* of Raymond de Sabunde in the 15th century. The 18th century was prolific of works in natural theology, that of Paley standing pre-eminent. The criticism of Kant was supposed to have given the science its death-blow, and later the design argument was thought to have received its quietus from Darwin. But the result has been revolution and reconstruction along profounder and more comprehensive lines rather than destruction.

Literature: HUME, Dialogues on Natural Religion; KANT, Criticism of Theistic Proofs, in Critique of Pure Reason; FLINT, Theism and Anti-Theistic Theories; PHYSICUS, Candid Exam. of Theism; the Bridgewater Treatises; JANET, Final Causes; LE CONTE, Evolution of Religious Thought; STERLING, Philos. and Theol. (A.T.O.)

Naturalism [Lat. *naturalis*, natural]: Ger. *Naturalismus*; Fr. *naturalisme*; Ital. *naturalismo*. (1) The theory that the whole of the universe or of experience may be accounted for by a method like that of the physical sciences, and with recourse only to the current conceptions of physical and natural science; more specifically, that mental and moral processes may be reduced

to the terms and categories of the natural sciences. It is best defined negatively as that which excludes everything distinctly spiritual or transcendental. In this meaning it is about equivalent to POSITIVISM (q. v.). (J.D.)

(2) Synonymous with MATERIALISM (q. v.).

(3) There is a growing use of the term to indicate a view which simply limits itself to what is natural or normal in its explanations, as against appeal to what transcends nature as a whole, or is in any way supernatural or mystical.

This is established in the case of the adjective NATURAL (q. v.), as in the claim that the mental and moral sciences should be classed with the 'natural' as opposed to the physical sciences. The term naturalist is also used for a scientific investigator in the biological and psychological, not in the physical, sciences. Besides this demand for the term naturalism as the theory of what is natural, including the mental and moral, from the side of science, a similar usage has come from theological study, where we have naturalism in interpretation and in doctrine opposed to supernaturalism; that is, naturalism is the appeal to natural occurrences of the mental and moral order as opposed to miracles, divine enlightenment, &c. Cf. also NATURALISM (in art).

It is extremely desirable that this distinction of usages should be recognized. Note the controversy occasioned by Balfour's *Foundations of Belief*, arising from the protests of naturalists (sense 3) against his description of naturalism (sense 1). In view of the oscillation of the philosophical term (cf. Ward, *Naturalism and Agnosticism*), the third usage is in many respects to be preferred. For the other meanings we have POSITIVISM and MATERIALISM covering the whole ground. And it is a false position from the start, as the development of science shows, to limit nature to physical nature, and that minus animated nature. Indeed, the development in the meaning of natural to include man is so firmly established that it were better to yield up the word naturalism altogether to go with it. (J.M.B.)

Naturalism (in art). A theory which holds it to be the true end of art to 'follow nature.' The rendering of a landscape or human character without subjective idealization; without omission of elements that are opposed to the personal or average taste and conscience. It is, however, distinguished from realism by implying faithfulness to the forces at work rather than minute copying of details. (J.H.T.–J.D.)

The term has had a varying meaning according to varying interpretations of the phrase 'follow nature' (see ART, II). At present the naturalistic school of art is characterized especially by individualism—emphasis upon the CHARACTERISTIC (q. v.) and often upon the unpleasant aspects of nature (by way of emphasizing the significant as over against the formally beautiful). It has been defined as 'science applied to literature,' since both science and art are by it regarded as seeking 'truth.'

In German, however, 'minute copying' is the rather associated with naturalism, not with realism; but usage is not well fixed. Alt (*Syst. d. Künste*, 1888, 19) says, 'The method which aims at the *complete* reproduction of all the details of sense-phenomena is, in our as yet incompletely developed terminology, called *naturalism* in contrast to realism, which aims to construct a picture only of the most striking phases of the object.' (K.G.)

Literature: VOLKELT, Aesth. Zeitfragen (1895), chap. v; STEIN, Entsteh. d. neueren Aesth. (1886), 81–270, 325 ff.; HÖFFDING, Rousseau (1897), 104 ff.; ZOLA, Le Roman Expér.; GUYAU, L'Art au point de vue sociol. (1889), 143 ff.; BRANDES, Die Hauptströmungen in d. Literatur (1892); BRAITMEYER, Gesch. d. poet. Theorie u. Krit. (1888–9); M. PILO, Estetica (1898). (J.H.T.)

Naturalism (in theology). The doctrine which excludes the supernatural from the religious realm, and refers the facts of religion either to the operation of natural agencies and laws, or to the divine conceived as identical with the natural order of the world. Cf. NATURALISM.

The naturalistic tendency in religion has been greatly strengthened by the doctrine of evolution. The tendency of naturalism is not so much to deny the divine agency as to merge that agency in the operations of nature.

Literature: H. BUSHNELL, Nature and the Supernatural (1876); WARD, Naturalism and Agnosticism (1899). See SUPERNATURALISM. (A.T.O.)

Nature [Lat. *natura*, from *nasci*, to be born or produced; an equivalent of the Gr. *φύσις*, from *φύειν*]: Ger. *Natur*; Fr. *nature*; Ital. *natura*. The word has a primary double sense, each of these meanings having in turn a number of subdivisions. (1) In the first place, nature means whatever (literally or figuratively) is born with the thing, and hence belongs originally to its own being instead of being acquired or superadded.

It thus means (*a*) the constitution, native

structure, essence, or very being of a thing. Thus we speak of the nature of anything—of a horse, stone, man, star, thought, soul, God, &c. The Scholastics used the term as equivalent, objectively or as regards the existence concerned, to essence, but as connoting more especially not the being in itself, but (*b*) considered as the active source (or principle) of the operations by which the being realized its destined end. Here is the transition to the second meaning.

(2) Nature is the sum total of forces which animate the created world, or the aggregate of events and changing things which make it up.

In this conception two quite distinct meanings are obviously contained. In one meaning, nature is conceived (*a*) as the dynamic agent concerned in bringing about the changes in the world. It is at least semi-personified. Thus the Scholastics talked of nature doing this and that; of various forces and qualities as the various modes of the operation of nature, &c. This use of nature, as a cause at large, was seized upon by Comte (see Positivism) as a sign of the 'metaphysical' stage of thought, distinguished equally from the theological, where God is the active cause, and the positive or scientific, where search for efficient agents is given up, and simple sequences and coexistences are traced. Under (2, *a*) we again have a subdivision, according as nature is conceived (*a*) as an independent, self-active agent, as in various forms of pantheism and mysticism, or as (*β*) a subordinate principle, a secondary cause, intervening between God as efficient principle and the details of existence. In its other meaning (*b*)—under (2)—nature is regarded as simply the name given to the sum total or phenomena in time and space; the physical world as presented to the senses. It is expressly restricted to phenomena, in their material relations to one another; and the idea of productive or formative agency is excluded. It is equivalent to the physical world, the realm of things and events with which physical science deals.

Few terms used in philosophy have a wider or a looser use, or involve greater ambiguity. While often used as equivalent to the mechanical and material world, as a system of particular objects and changes, it rarely quite loses its sense of primordial, primitive, intrinsic, or, indeed, of something dynamic and productive; and so the term is used in an active or passive, a spiritual or material sense, about as the writer pleases. It is not surprising, then, that historically we find it used to mark off, in a most definite way, the world from God, and again to identify the world with God, and once more to afford a connecting principle between God and the details of the world. Its various sub-meanings can, however, best be brought out in connection with the history of the term.

It is perhaps the oldest of all formulated and general philosophic concepts—that is, in its Greek form *φύσις*. Aristotle expressly calls the earlier philosophers (particularly the Ionic school) physicists (*φυσικοί*) and physiologists (*φυσιολόγοι*) to express their preoccupation with nature as the object of philosophy. *Περὶ φύσεως* (concerning nature) is the putative, traditional, or actual title of the writings of Xenophanes, Melissus, Parmenides, and Heraclitus. The term began with that wide and vague sense which has always hung about it—something designating the whole world, considered not as a chaos of particular things, but as referred to some general principle for explanation or to account for its production. Thus the statement of Windelband (*Hist. of Philos.*, 73, Eng. trans.) that the 'constitutive mark of the concept *φύσις* was originally that of remaining ever like itself,' its contrary being the transient, is altogether too narrow. While the chief object of interest to the 'physiologues' was what we should term the physical world, and their categories are, to us, of a physical sort (fire, air, water, &c.), yet it must be remembered that no clear distinction of mind and matter had yet been made; nature was conceived of as living and, in so far at least, as psychical; the scheme, in a word, was Hylozoism (q.v.), not materialism. It was with Plato that the distinction between the physical and the metaphysical was clearly stated, and thus the tendency initiated to use the term nature in a restricted sense which marked it off from the spiritual; it was the sphere of becoming, as distinct from that of being, and hence was contingent, and the object of probable knowledge only. (God as distinct from *φύσις* was the *ὅθεν φύεται*.) But it was far from being identical with what we should term nature in the purely physical sense, the term *σῶμα* much more nearly expressing that. Moreover, in general and in detail, a teleological explanation of nature was required by which it was subjected to the good and to reason (see Nous). In Aristotle, this Platonic conception of nature joined with a strain derived from the Sophists, and the term got for the

first time a complete, explicit statement—the term, though not the idea, being rather incidental in Plato. In their political and ethical discussions, the Sophists (Hippias, see Xenophon, *Mem.*, iv. 14 ff.) had raised the question as to whether obligation exists by nature (*φύσει*) or by institution or convention (*θέσει* or *νόμῳ*). This gave rise to the conception of nature as a standard or norm that could be used to justify objective validity as distinct from arbitrary assertion or merely subjective convenience. The dramatists (Sophocles, Antigone) had already developed the conception of a law of nature which was universal and eternal, and the ethical industry of Socrates was devoted to establishing the existence and worth of such a law-giving nature. Hence, in Aristotle we have the conception of nature as, on one hand, the system of moving, changing things so far as directed to realizing an end, or (in their totality) *the* end, the absolute good; and, on the other, as the standard by reference to which all particulars of a given class, as well as all failures, deviations, and abnormalities, are to be measured; while it is distinguished from art because its efficient cause is internal, and not external. It is in this sense, for example, that man is, by nature, a political animal, and that the state is, by nature, prior to the individual citizen.

This conception, like the rest of the Aristotelian philosophy, was reformulated by the Scholastics, and thus has become (in the popular sense of nature as at once a productive force and the standard of order and regularity) a part of the ordinary view of the world. But there are two elements involved in the Aristotelian conception; and even if we grant that his own synthesis was adequate, it was hardly possible that later writers should not emphasize one factor or the other. On the one hand, there is the mechanical element—the physical is just the realm of extended and movable bodies, being thus distinguished from both the metaphysical and the teleological (*Met.*, vi. 1, and *De Caelo*, i. 1).

In the Epicurean philosophy, this conception becomes dominant and exclusive; the teleological factor, the reason or end, which, according to Aristotle, had animated the complex of moving bodies, is absolutely eliminated; and nature is simply the sum total of the mechanical impacts and arrangements of the purely quantitative elements, the atoms. This is the view which found its classical expression in the *De rerum Natura* of Lucretius, a poem which perhaps has done more than any one other cause to give to the term its limited, purely physical, content.

But all the order and uniformity and system (orderly unity) of nature is due, according to Aristotle, to the fact that it represents the transition of the potential to completion, under the teleological influence of forms, and of the supreme Form (q.v.), God. In it, so far as it is really nature, nothing is superfluous, nothing perverted, nothing happens just by accident. It is an organic whole (*ζῶον*). This aspect is emphasized by the Stoics (Strato being the connecting link, Windelband, 179), save that, denying the transcendence of form and nous, nature is regarded as self-moved, both efficiently and teleologically. Nature is not merely ordered and attracted to perfection by God; it is God. It is itself law, cause, standard, and providence. 'To live in accordance with nature' is the sum of all virtue. Nature is also used by the Stoics, in a restricted sense, as the peculiar animating principle of the plant, as distinct from the *ἕξις* of the inorganic, the *ψυχή* of the animal, or the *νοῦς* of man (Erdmann, *Hist. of Philos.*, i. 189, trans., and Zeller).

With Plotinus, nature again assumes a definite intermediate position, established, however, on the basis of emanations, not upon a teleological one. As Nous (q.v.) comes below the supreme and ineffable One, so nous subdivides into a higher and lower soul (*ψυχή*), the higher which contemplates and enjoys the rational forces (*νοῖ*) which make up the *νοῦς*: the lower, which after the archetype thus contemplated, carries them into act and thus creates the objective world. This lower soul is nature—equivalent practically to the world soul of Plato and the *λόγος σπερματικός* of the Stoics. In the middle ages three strains appear. One is the orthodox scholastic, following Aristotle, expressly defining nature as the essence of anything, so far as it operates in a regular way to bring the thing to its appointed end. Another is the mystic, which continued the Platonic and Neo-Platonic sense, but in a more pantheistic way, tending to make nature the mysterious, vital creative energy of God. The third is the Arabian interpretation of Aristotle. Averroes, like the Stoics, interpreted Aristotle so as to deny the transcendent nous; form and purpose are wholly immanent in nature. Hence the distinction of nature (*De Caelo*) into *Natura naturans*, equivalent to God, the one reality viewed as active, as form and force, and into

Natura naturata, the world as materialized form, as effect (see Siebeck, *Arch. f. Gesch. d. Philos.*, iii. 370, for origin of this distinction). The two terms made their way both among the Mystics and the Scholastics, being adapted to their respective uses. They appeared with Cusanus and Giordano Bruno, and (probably) from them made their way into Spinoza. With him, in scholastic fashion, the nature of a thing is its essence and its idea (*Ethica*, iv. def. 8); and so the supreme essence is also *Natura*, *Natura naturans*, or *Deus*, while the world of modified existences is *Natura naturata* (i. pr. 29, schol.). In his earlier writings he distinguishes the latter into *generalis* and *particularis*, but abandons this in the *Ethics*.

Modern thought has added no essentially new elements to the concept of nature. It has, however, clearly brought out the homogeneity of nature, its identical structure and operation in all its parts, mundane and stellar, thus effectually doing away with the ancient conception of a diversity of grades, values, and qualities, a conception which, more than any other, is the philosophical idea underlying modern science (Windelband, loc. cit., 402). So far as science is concerned, the mechanical conception of nature may be said to have become, through the writings of Descartes, Galileo, Hobbes, and Newton, completely victorious, as against the Platonic and Aristotelian conceptions. The problem still remains, however, whether, taken as a totality and system, nature does not demand a rational and teleological valuation; and thus at the Renaissance, in the 17th and again in the 19th century, have arisen philosophic systems which have insisted that nature as a totality or system is an expression of thought, and which have attempted, with varying degrees of success, to combine a modified Aristotelianism with the detailed results of contemporary science.

This found its most ambitious expression in the so-called *Naturphilosophie* of Oken, Schelling, and Hegel, in the early part of the 19th century. In another connection the names of Rousseau and Goethe need special mention. Rousseau's motto and warcry was 'Return to Nature,' and in his treatment of the idea all the various senses and ambiguities were rolled into one. Nature meant at once the historically primitive and original; that which is distinct from art and the artificial; that which is opposed to the politically instituted; and that which is normative and ideal. In formulating the opposition between nature and culture he stimulated Herder and Schiller (as well as many others), and was, indirectly, an important factor in the development of the Modern German philosophy of history and society. Goethe, moved by the discussion, was led back to Spinoza; revived Spinoza's conception of nature, giving it, however, a thoroughly dynamic and organic interpretation, and by embodying it in his poetry, as well as in his prose criticism and his scientific efforts, influenced not only the *Naturphilosophie* movement already referred to, but all modern literature and aesthetic theory. (J.D.)

Nature (law of): see NATURAL LAW.

Nature (moral): Ger. (*sittliche*) *Natur*; Fr. *nature morale*; Ital. *natura morale*. The constitution of man as a being capable of morality, i. e. as a being at once sentient and rational, whose sentient nature can be rationalized.

Plato held that human nature is an economy or constitution, like a state, in which each part has its appropriate work to do for the nature as a whole. Human virtue or excellence accordingly consists in the harmonious activities of all the parts in the interest of the total welfare of the soul. Aristotle held that the proper or characteristic activity of any being is determined by its specific nature, and that, since man's specific nature is rationality, his true life is an activity 'according to right reason.' The Stoics regarded human nature as part of the nature of things, and held that to live 'according to nature' or according to the reason which is the pervading nature of the universe, is the sum and substance of morality. The early British rationalists (Cudworth, More, Clarke) also held that man as a moral or rational being was capable of discerning the rational nature of things, and that moral distinctions are 'eternal and immutable.' Butler returned to the Platonic or psychological view of moral nature as a constitution, in which there are various principles, differing in rank or authority, as well as in power, among which conscience occupies the supreme place. According to the associationist and utilitarian school, the moral, like the intellectual nature of man, is derivative, not original; complex, not simple. The evolutionists see in it the changing product of the evolutionary process, the result of the action and reaction of man and his environment, physical and social. The idealists seek to establish the ultimateness and absoluteness of the moral nature, Kant regarding it as noumenal or transcendent, Hegel and his followers finding in it

the highest expression of the principle of thought of the universe. Cf. ETHICS, and ETHICAL THEORIES.

Literature: many general works on ETHICS (q. v.), also BIBLIOG. F, i, *d*. (J.S.)

Nature (philosophy of): Ger. *Naturphilosophie*; Fr. *philosophie de la nature*; Ital. *filosofia della natura*. That branch of fundamental philosophy which deals with NATURE (q. v.): co-ordinate with theology (philosophy of God) and with rational psychology or philosophy of spirit (as philosophy of man). Often used synonymously with cosmology.

For the earlier history see NATURE. Kant first connects it expressly with the modern scientific view of the world, and defines it as the attempt to carry back the facts and forces of physical science to a limited number of forces—in his own theory, attraction and repulsion. His own philosophy is dynamic, but in a mechanical sense. Schelling emphasizes, on the side of method, the self-contained, non-empirical character of Naturphilosophie; and, in content, the dynamic-organic concept. According to Hegel, it takes up into itself all the results and methods of physics, but develops them, showing they do not have their basis in experience, but constitute a self-included, necessary whole derived from thought itself (Begriff).

The content of the system is found in the dialectic sequence which takes us from the extreme externalization of thought (space and time) to its internalization in sentient life—living and feeling organisms. With the latter, the philosophy of spirit takes up its tale, since thought is now coming to conscious recognition of itself. The philosophy of nature soon fell into disrepute, partly because of the arbitrary and artificial use made of its categories; and even more largely because the manifold results of the continually multiplying specialisms in science defied all attempts at reduction to a few fundamental principles. Spencer has revived the notion (though not the term) in his attempt to connect the phenomena of life, mind, and society by the formula of evolution, in a way which reduces all facts to terms of integration of motion and differentiation of matter. There are many signs of attempts to reinstate a philosophy of nature in connection with the idea of evolution, often in a sense quite divergent from Spencer; but the special sciences still lack organization, both themselves and in relation to one another, to an extent which makes the problem the most baffling of all the phases of philosophy to-day. Among recent English-speaking authors, Tyndall, Huxley, John Fiske, Cope, and Le Conte have occupied themselves particularly with the philosophic interpretation of scientific phenomena. In Germany the names of Lotze, Fechner, Haeckel, Wundt, Ostwald, and Mach are prominent. (J.D.)

Nature (state of): see STATE OF NATURE.

Nature Worship: Ger. *Naturverehrung*; Fr. *culte de la nature*; Ital. *culto della natura*. The worship of natural forces or objects, or of these as embodied or symbolized in living or quasi-living forms.

Religions are classifiable under the categories of nature and ethics. The objects of worship in the nature-religions are fundamental forces of nature to which the processes of hypostatization and ethical personalization have been applied in various degrees.

Literature: ANDREW LANG, art. Religion, Encyc. Brit. (9th ed.). (A.T.O.)

Naturism [Lat. *natura*, nature]: Ger. *Naturismus*; Fr. *naturisme*; Ital. *naturismo*. The theory that the primitive form of religion was the deification of nature. See the works cited under RELIGION (philosophy of). (J.M.B.)

Nazarites [Gr. Ναζαρίτης; Heb. *nazar*, to separate oneself]: Ger. *Nazariten*; Fr. *Nazaréens*; Ital. *Nazareiti*. Among the ancient Hebrews, devotees of either sex who had taken an oath to abstain from wine and strong drink, from cutting the hair, and from ceremonial uncleanness.

The vow of the Nazarite was either limited or for life. For its conditions and the mode of its fulfilment see Numbers vi in the Old Testament Scriptures. (A.T.O.)

Near-sightedness: Ger. *Kurzsichtigkeit*; Fr. *myopie, vue basse*; Ital. *vista corta*. A popular term for MYOPIA (q. v.).

Nebular Hypothesis: Ger. *Nebular-Hypothese*; Fr. *hypothèse de la nébuleuse primitive*; Ital. *ipotesi della nebulosa*. The doctrine that the primaeval form of the matter composing the bodies of the universe was that of a glowing gas or nebula, and that the earth, sun, planets, stars, and all other seemingly solid bodies of the universe were formed by the cooling and consequent condensation of this gas.

Somewhat obscurely conceived by Swedenborg; more definitely outlined by Kant and Laplace (*Système du Monde*); developed by Herbert Spencer as one of the general processes of evolution; and reduced to the form of a physical theory by Geo. H. Darwin. (S.N.)

Necessaries [Lat. *necessarius*, indispens-

able]: Ger. *Gegenstände des Lebensbedarfs*; Fr. *le nécessaire* (sing.); Ital. *il necessario* (sing.). Commodities whose use is indispensable for the maintenance of economic efficiency (cf. LUXURIES).

It follows from this definition that things which are necessaries for one man, increasing his economic efficiency more than in proportion to their cost, may be luxuries to another with whom their use is not accompanied by such increase of efficiency.

We must beware of defining necessaries as things which a man needs in order to keep alive. This definition rests on a very superficial view of the distinctions involved. Those who use a definition of this kind are compelled to create a class of 'decencies' intermediate between necessaries and luxuries. A decency is a commodity which is not necessary in the superficial sense, but which the experience of the community has so far proved to be necessary in the deeper sense that it insists on having it without really stating or knowing the reason why. (A.T.H.)

Necessary: see NECESSITY.

Necessary (1) and (2) **Sufficient Condition**: Ger. (1) *nothwendige und* (2) *hinreichende Bedingung*; Fr. (1) *condition nécessaire et* (2) *condition suffisante*; Ital. (1) *condizione necessaria e* (2) *condizione sufficiente*. An event, p, is a sufficient condition of another event, q, if whenever p happens q happens; p is a necessary (or essential, or, better still, indispensable) condition of q if q does not happen unless p happens.

These are phrases which the mathematicians find indispensable; it would add greatly to clearness on the part of writers on logic if they were to become familiar phrases with them as well.

These relations are, as far as their logical significance is concerned, nothing more than those which are expressed, for terms, by the first two forms of the simple PROPOSITION (q.v.), (*a*) *All a is b* and (*ū*) *None but a is b*. To say that all citizens are voters and that none but citizens are voters is the same thing for logic (that is, as statements that are to constitute the premises and the conclusions of arguments) as to say that being a citizen is the necessary and sufficient condition of being a voter; and, again, it is the same as to say, in terms of extension instead of intension, that citizens are-identical-with voters. Another name for indispensable condition is *conditio sine qua non*. As proof of the urgent necessity for more exact nomenclature in connection with these two relations, see the remarkable footnote in Sigwart's *Logik*, 286 (Appendix II in the English translation). Usually *a* condition is used as meaning an indispensable condition, and *the* condition as meaning, more or less loosely, the necessary and sufficient condition. (C.L.F.)

Necessary (in logic): Ger. *nothwendig*; Fr. *nécessaire*; Ital. *necessario*. That is necessary which not only is true, but would be true under all circumstances.

Something more than brute compulsion is, therefore, involved in the conception; there is a general law under which the thing takes place. Thus necessity, in the philosophical sense, is quite opposed to any '*Noth*' that '*kennt kein Gebot*.' Springing from law, and thus being essentially rational, it would perhaps be more accurately described as persuasive than as compulsive.

The Stoics defined the necessary as 'that which, being true, is not susceptible of becoming false, or, if it be so, is prevented from ever becoming false' (Diog. Laer., vii. 75). Kant defines the necessary as that which is *a priori* certain (*Krit. d. reinen Vernunft*, 1st ed., 125).

Necessary adjunct: a phrase which a very improper usage makes to signify a property, that is, an inessential predicate, not only belonging at all times to every individual of the species of which it is a necessary adjunct, but further, belonging to nothing else.

Necessary cause: one which acts by a necessity of its nature and is not free.

Necessary object, says Kant, is one which is determined according to concepts by the connection of perceptions (*Krit. d. reinen Vernunft*, 1st ed., 234).

Necessary sign: a sure indication. (C.S.P.)

Necessitarianism [Lat. *necessitas*, necessity]: Ger. *Necessitarianismus*, *Nothwendigkeitsgläubiger* (a necessitarian, Barth); Fr. *nécessitarisme*; Ital. (not in use). See DETERMINISM. (J.S.)

Necessity [Lat. *necessitas*]: Ger. *Nothwendigkeit*; Fr. *nécessité*; Ital. *necessità*. (1) The state or condition that cannot be otherwise than it is; that must be just as it is.

(2) The principle in virtue of which the condition of the universe as a whole, or any particular part of it, is rendered, both as to its existence and quality, inevitable. Opposed to both freedom and chance, but especially, in its strictly philosophical use, to CHANCE (q. v.) or contingency. That which has the property of necessity is said to be necessary.

It is frequently used to designate the chief principle of those philosophies which admit

only the principle of cause and effect, and which deny purposiveness to the universe. Technically, various forms of it have been recognized. (1) Logical (also metaphysical) necessity: the necessity of thought in virtue of which a truth, either immediate or inferential, must be conceived in such and such a manner; thus freedom itself would be a logical necessity if it followed, in accordance with the principles of identity and non-contradiction, from conceded premises. (2) Mathematical necessity: the similar logical relationship of parts of a demonstration or construction in mathematical reasoning. (3) Physical (also natural) necessity: that which arises from laws of nature or which arises in the course of nature from the principle of causation: mechanism, the 'reign of law'; invariable sequence, according to modern writers, e.g. J. S. Mill. (4) Moral necessity: that required by moral law, by the moral order of the universe; that which follows from the nature of God as a moral governor; also used in a narrower sense, as equivalent to 'practical' necessity, which is neither logical nor physical, but the result of a certain need or demand regarded as of fundamental importance (see POSTULATE).

These distinctions we owe directly to Leibnitz, and they are most fully developed in his *Théodicée*. According to him there are three main types. (*a*) Metaphysical, logical, geometrical: that which cannot be otherwise than as it is without self-contradiction; absolute necessity. (*b*) Physical necessity: that of the order of nature, which might conceivably be otherwise, but which follows from the will of God, who has chosen the best world; hypothetical necessity. (*c*) Moral necessity: that which animates a moral being, even God himself, in the choice of good. Since a perfectly moral being would have a perfectly adequate conception of the good, it would by moral necessity choose it. In this sense, physical necessity depends upon moral necessity. The term is also used in a strictly logical sense, equivalent to APODICTIC (q.v.), and also to designate the opposite of those theories which assert free will (necessitarianism: see DETERMINISM, and WILL).

In the Pre-Socratics, necessity was a quasi-mythical expression for the law or order of the cosmos, as in the teaching of Parmenides that the goddess at the centre of the world is Necessity—an (apparently) Pythagorean conception which finds expression in the myth of Er (Plato, *Rep.*, Bk. X), where the entire universe is made to revolve upon an axis of necessity. Heraclitus used the idea (in the form of destiny) to account for the fact that a certain balance and system is observed in all change. With the Atomists (Leucippus) it becomes (ἀνάγκη) a definite philosophical concept; the atoms, darting about at random, impinge upon one another; from the aggregations thus formed, there is, of necessity, a whirling motion set up. With Plato (aside from incidental and non-technical use of it as equivalent to the force of proof and demonstration) necessity is the co-author, with νοῦς, of the sensible world; as irrational it is blind, indifferent to good, since νοῦς alone is the principle of ends, or of the good, and hence that which keeps the world in a state of partial non-being and which prevents its arriving at completion (*Timaeus*, 48, 56, 68). Aristotle repeats the same idea (*De An. part.*, IV. ii. 677). Matter resists form, and thus hinders NATURE (q.v.) from arriving at its actualization. (The idea seems to be that in part matter lends itself to the realization of purposes, but in part has an impetus of its own which is quite indifferent to ends.) In this indifference matter is thus contingent—it may or may not present certain traits. As such it is τύχη, chance; so that necessity in the physical sense, and chance in the teleological, are practically one and the same thing. Hence, in his logical writings necessity has quite another meaning. Of future events, we cannot make a necessary assertion; the general tendency of nature may be thwarted by chance. Hence our judgment is not of determinate truth. On the other hand, of universals, of past events, &c., any judgment is either necessarily true or false. Here the tendency comes out to identify necessity with the immanent logical rationale of any subject, that from which perfectly definite consequences follow. The Stoics fuse the various senses of necessity—that of (*a*) the source of physical world-order, (*b*) the universal of reason from which determined conclusions result, and (*c*) the natural (or temporal) causal antecedent (Zeller, *Stoics, Epicureans, and Sceptics*, 170–82, and Windelband, *History*, 181). Since the Atomists did not work out their own idea systematically, and even presupposed a more or less random movement upon which necessity supervened, we may fairly regard the Stoics as the authors of the conviction that everything, everywhere, is controlled by necessity admitting of no exception—in other words, of the idea of the

universality of natural causation, which is fate. This conception is common to what is called fatalism, also, in oriental philosophies: the hypothesis of a fixed and immutable world decree.

Spinoza carries the fusion still further by expressly identifying the whole causal relationship with the logical or mathematical—the world follows from the nature of God by the same necessity that various truths follow from a geometrical definition. (It was partly in reaction from Spinoza that Leibnitz made the distinctions referred to above.) It was characteristic of the whole rationalistic school (see RATIONALISM) to identify reality with the requirements of logical necessity, as manifested in the principles of identity and non-contradiction; and if, like Leibnitz, they made a distinction between truths of reason and truths of matter of fact (which are empirical), and thus avoided the Spinozistic identification of logical relationship with natural sequence, it was a concession to common sense rather than a philosophic implication of their system. Kant introduces a new motive. On the one hand, growing natural science had given to the conception of necessity (causal relationship) in nature a solidity and concreteness which it could not have had in earlier writers; on the other hand, he rejects the dogmatic identification of the laws of being with those of logical thought. Hence his theory makes causality and thus necessity absolutely true of all nature, or the world of phenomena, by regarding causation as a category involved in the presentation of the world of sense to an experiencing subject. The source of necessity is thus found in the understanding as applied to sense; so that it may fairly be said that Kant restores in a critical and constructive way that which he had rejected in a dogmatic and formal way, namely, the origin of necessity in reason. At least, this path was followed by his idealistic successors, finding its outcome in the expression of Hegel (*Logic*, § 158), that 'freedom is the truth of necessity,' that is to say, that the determination of one phase of the objective world by another is at bottom but the self-determination of conscious mind, so that the necessary object, when experienced completely, appears as a co-operating factor in the development of free spiritual life. (J.D.)

Literature: Works on metaphysics and logic; G. TAROZZI, La dottrina della necessità (2 vols., 1895–7). (J.M.B., E.M.)

The following distinctions are usual:

Internal necessity springs from the nature of the subject of the necessity; *external necessity* comes from the outside.

Internal necessity is either *absolute* or *secundum quid*. *Absolute necessity* belongs to that whose being otherwise would involve contradiction. *Necessity secundum quid* is that which depends upon some matter of fact. Thus the Aristotelians held that a body falls to the ground by a necessity of its own nature, without external force or agency; yet it is easily prevented from falling.

External necessity, also called *necessity ex hypothesi*, because depending on an external condition, is distinguished in whatever ways the necessary is distinguished in the doctrine of the MODAL (q. v.), and, in particular, in reference to the *sensus compositus* and *sensus divisus*. In addition, external necessity is divided according as the realization of the condition precedes, is contemporaneous with, or follows after, the necessary result. Necessity from a previous condition is either that due to God's foreknowledge or it is *causal*. *Causal necessity* (used also in modern logic) is either *necessity of compulsion* or *necessity of determination*.

Necessity determined by a subsequent condition is either *ex hypothesi finis* or *ex hypothesi eventus* (as the apostle says, 'it is necessary that offences should come'). Necessity *ex hypothesi finis* is either *ad esse* or *ad bene esse*.

Another common distinction is between necessity *in causando*, *in essendo*, and *in praedicando*, phrases which explain themselves.

Still another threefold distinction, due to Aristotle (1 *Anal. post.*, iv), is between necessity *de omni* (τὸ κατὰ παντός), *per se* (καθ' αὐτό), and *universaliter primum* (καθόλου πρῶτον). The last of these, however, is unintelligible, and we may pass it by, merely remarking that the exaggerated application of the term has given us a phrase we hear daily in the streets, 'articles of prime necessity.' Necessity *de omni* is that of a predicate which belongs to its whole subject at all times. Necessity *per se* is one belonging to the essence of the species, and is subdivided according to the senses of *per se*, especially into the first and second modes of *per se*.

Among modern distinctions we may mention that of Benno Erdmann between *predicative* and *deductive* necessity. The former seems to be necessity for a judgment being as it is in order to express what is in its immediate object.

Logical necessity is determined by the laws

of the understanding, according to Kant (*Krit. d. reinen Vernunft*, 1. Aufl., 76).

Metaphysical necessity is that of God's existence.

Simple = absolute necessity. See above.

The adjectives by which different kinds of necessity are usually distinguished include absolute, antecedent, causal, comitant, composite, consequent, deductive, disjunct, disjunctive, external, formal, hypothetical, immediate, internal, logical, material, mediate, metaphysical, modal, moral, physical, practical, predicative, prime, simple, teleological, unconditional. (C.S.P.)

Necromancy: see MAGIC.

Need [AS. *nyd*]: Ger. *Bedürfniss*; Fr. *besoin*; Ital. *bisogno*. A constitutional or acquired craving or want, either bodily, revealing itself also in consciousness, or mental.

Needs are deep-seated demands of nature; appeased by recurrent satisfactions; extremely painful or depressing if not satisfied; and often acting as subconscious motives which influence action without taking form as conscious ends. (J.M.B., G.F.S.)

Negation [Lat. *negatio*, which translates Gr. *ἀπόφασις*]: Ger. *Verneinung*; Fr. *négation*; Ital. *negazione*. Negation is used (1) logically, (2) metaphysically. In the logical sense it may be used (*a*) relatively, and (*b*) absolutely. Used relatively, when applied to a proposition, it may be understood (*α*) as denying the proposition, or (*β*) as denying the predicate.

(1) In its logical sense, negation is opposed to affirmation, although, when it is used relatively, this is perhaps not a convenient contrary term; in its metaphysical sense, negative is opposed to positive (fact, &c.).

The conception of negation, objectively considered, is one of the most important of logical relations; but subjectively considered, it is not a term of logic at all, but is prelogical. That is to say, it is one of those ideas which must have been fully developed and mastered before the idea of investigating the legitimacy of reasonings could have been carried to any extent.

The treatment of the doctrine of negation affords a good illustration of the effects of applying the principle of PRAGMATISM (q.v.) in logic. The pragmatist has in view a definite purpose in investigating logical questions. He wishes to ascertain the general conditions of truth. Now, without of course undertaking to present here the whole development of thought, let it be said that it is found that the first step must be to define how two propositions can be so related that under all circumstances whatsoever,

The truth of the one entails the truth of the other,

The truth of the one entails the falsity of the other,

The falsity of the one entails the truth of the other,

The falsity of the one entails the falsity of the other.

This must be the first part of logic. It is deductive logic, or (to name it by its principal result) syllogistic. At all times this part of logic has been recognized as a necessary preliminary to further investigation. Deductive and inductive or methodological logic have always been distinguished; and the former has generally been called by that name.

In order to trace these relations between propositions, it is necessary to dissect the propositions to a certain extent. There are different ways in which propositions can be dissected. Some of them conduce in no measure to the solution of the present problem, and will be eschewed by the pragmatist at this stage of the investigation. Such, for example, is that which makes the copula a distinct part of the proposition. It may be that there are different ways of useful dissection; but the common one, which alone has been sufficiently studied, may be described as follows:

Taking any proposition whatever, as

'Every priest marries some woman to some man,'

we notice that certain parts may be struck out so as to leave a blank form, in which, if the blanks are filled by proper names (of individual objects known to exist), there will be a complete proposition (however silly and false). Such blank forms are, for example:

Every priest marries some woman to ——,

—— marries —— to some man,

—— marries —— to ——.

It may be that there is some language in which the blanks in such forms cannot be filled with proper names so as to make perfect propositions; because the syntax may be different for sentences involving proper names. But it does not matter what the rules of grammar may be.

The last of the above blank forms is distinguished by containing no selective word such as some, every, any, or any expression equivalent in force to such a word. It may be called a PREDICATE (q.v., sense 2) or *ῥῆμα*.

Corresponding to every such predicate there is another, such that if all the blanks in the two be filled with the same set of proper names (of individuals known to exist), one of the two resulting propositions will be true, while the other is false; as

Chrysostom marries Helena to Constantine:

Chrysostom non-marries Helena to Constantine.

It is true that the latter is not good grammar; but that is not of the smallest consequence. Two such propositions are said to be contradictories, and two such predicates to be negatives of one another, or each to result from the negation of the other. Two propositions involving selective expressions may be contradictories; but in order to be so, each selective has to be changed from indicating *a suitable selection* to indicating *any selection that may be made*, or vice versa. Thus the two following propositions are contradictories:

Every priest marries some woman to every man;

Some priest non-marries every woman to some man.

It is very convenient to express the negative of a predicate by simply attaching a *non* to it. If we adopt that plan, *non-non-marries* must be considered as equivalent to *marries*. It so happens that both in Latin and in English this convention agrees with the usage of the language. There is probably but a small minority of languages of the globe in which this very artificial rule prevails. Of two contradictory propositions each is said to result from the *negation* of the other.

The relation of negation may be regarded as defined by the principles of contradiction and excluded middle. See LAWS OF THOUGHT. That is an admissible, but not a necessary, point of view. Out of the conceptions of non-relative deductive logic, such as consequence, coexistence or composition, aggregation, incompossibility, negation, &c., it is only necessary to select two, and almost any two at that, to have the material needed for defining the others. What ones are to be selected is a question the decision of which transcends the function of this branch of logic. Hence the indisputable merit of Mrs. Frankin's eight copula-signs, which are exhibited as of co-ordinate formal rank. But, so regarded, they are not properly copulas or assertions of the relation between the several individual subjects and the predicate, but mere signs of the logical relations between different components of the predicate. The logical doctrine connected with those signs is of considerable importance to the theory of pragmatism.

For the negation of modals see MODAL.

Conversion by negation = CONTRAPOSITION (q. v.).

Negant or *negative negation* is the negation effected by attaching the negative particle to the copula in the usual Latin idiom, 'Socrates non est stultus,' in contradistinction to *infinite* (ἀορίστη), or *infinitant, negation*, which is effected by attaching the negative particle to the predicate, 'Socrates est non stultus.'

Kant revived this distinction in order to get a triad to make out the symmetry of his table of categories; and it has ever since been one of the deepest and dearest studies of German logicians. No idea is more essentially dualistic, and distinctly not triadic, than negation. *Not*-A = *other than* A = *a second thing to* A. Language preserves many traces of this. *Dubius* is between *two* alternatives, yea and nay.

(2) In the metaphysical sense, negation is the mere absence of a character or relation that is regarded as positive. It is distinguished from privation in not implying anything further.

Spinoza's celebrated saying, of which the Schellings have made so much, 'omnis determinatio est negatio,' has at least this foundation, that *determinatio* to one alternative excludes us from another. The same great truth is impressed upon youth in the utterance: 'You cannot eat your cake and have it too.' (C.S.P., C.L.F.)

Predicates are not denied to subjects at hazard—it would be a great waste of time to set forth in language the fact that the vast majority of predicates are inapplicable to the vast majority of subjects. In order that a negative statement may have any value, there must have been some reason to suppose that the affirmative statement of which it is the exact denial was true, either that it had been proposed for our acceptance by an interlocutor, that it had been part of our stored-up knowledge or purported knowledge, or that we had in mind what we took at the moment to be sufficient ground for its acceptance. Sigwart is, therefore, right in maintaining that the negative statement, in its origin, is not of the same primitiveness as the affirmative statement; '*a* is not *b*' is merely a

shorter form, permitted by language, for 'that *a* is *b* is false,' or 'that *a* is *b* is non-occurrent.' Cf. JUDGMENT, ad fin. (C.L.F., J.M.B.)

Negative [Lat. *negativa*; a term appearing first in logic in Boethius, in place of the previous *abdicativa*, although *negatio* was much earlier. It translates Aristotle's ἀποφατική. Cognate words were used by Plato, and even earlier]: Ger. *verneinend*; Fr. *négatif*; Ital. *negativo*. Involving NEGATION (q. v.), either in the second application of the logical sense, or in the metaphysical sense given under that term.

Negative abstraction is an act of abstraction derived from considering something which does not possess the character considered.

Negative (or *necessary*) *condition*: see NECESSARY AND SUFFICIENT CONDITION.

Negative criterion: a criterion which is a negative condition; a test. Most criteria are of this sort.

Negative discrepancy: see DISCREPANCY.

Negative distinction: a mutual real distinction separating anything from its negation; as the distinctions of heat and cold (no heat), light and darkness (no light), sound and silence (no sound).

Negative idea: see *Negative name*.

Negative mark: a mark which consists in the non-occurrence of a positive phenomenon under certain conditions.

Negative name: a common name which characterizes an object by its want of some character. 'I appeal,' says Locke, 'to every one's own experience, whether the shadow of a man, though it consists of nothing but the absence of light (and the more the absence of light is, the more discernible is the shadow), does not, when a man looks on it, cause as clear and positive an idea in his mind as a man himself, though covered over with clear sunshine? And the picture of a shadow is a positive thing. Indeed, we have negative names, which stand not directly for positive ideas, but for their absence, such as *insipid, silence, nihil,* &c., which words denote the positive ideas, *taste, sound, being,* with a signification of their absence' (*Essay concerning Human Understanding,* II. viii. 5).

Negative negation: see NEGATION.

Negative syllogism: any syllogism of the second figure, or the *modus tollens,* where the reasoning turns upon the change of quality. The canon of syllogism, that nothing can be concluded from two negatives, is inaccurate. What is requisite, in non-relative syllogism, is that the middle term should be once distributed and once undistributed. Darapti and Felapton, which appear to violate this rule, only do so because one of the premises, so far as it is efficient, is virtually a particular. What is requisite is, that one of the interlocutors should select the individual denoted by the middle term in one premise and the other in the other.

Negative whole is one which has no parts; as God, the soul, &c. (C.S.P.)

Negative term. Negation arises first, without doubt, in connection with the judgment—it is a secondary function of thought, which presupposes the existence of positive judgments (Hamilton, Sigwart, Wundt). It is true that the concept cat cannot be formed by the child except by separating out a certain quality-complex from a background of all that is other than cat; but this background exists in its mind only vaguely, like images upon a retinal periphery, and until it has become a distinct object of consciousness it does not constitute a concept. Later, thought permits itself to affirm not only that *a is-not b*, but also that *a is not-b*. The concept *not-b* is, in many cases, no more difficult to form than the concept *b*; it is frequently hard to say which of two concepts, as odd or even, to greet an acquaintance or to cut him, is positive and which is negative—to be immortal means to continue to live, and to be mortal means not to continue to live. But this similarity between positive and negative terms holds only so long as the quality which constitutes their signification is one and indivisible. Terms in general are implements for holding together a certain group of objects, each in the possession of a certain complex of marks; a negative term has for its denotation all *other* objects in the universe of discourse, whatever that may be, and for its connotation the *absence of some one at least* of the elements of the complex of marks signified by the positive term. The group of objects to which a negative term applies is all the objects other than those to which the positive term applies; for signification there is not, it is true, any mark common to this group of objects (for in general they have no such mark), but this is merely to say that a negative name has no positive concept corresponding to it (Keynes). The significations of the positive term and of the negative term are very different; the one involves a *combination* of quality-elements, the other an *alternation of absences* of quality-elements. When, therefore, Lotze says that it remains a for ever

insoluble task to abstract the qualities of the *not-man*, he says what is true but unimportant. *Not-man* is not destitute of import, as Lotze says it is, but its import consists in an *alternation of deficiencies of some one, at least, of the elements of the intent of man.* (C.L.F.)

Negative Sensation: Ger. *negative Empfindung*; Fr. *sensation négative*; Ital. *sensazione negativa.* Sensation due to stimulus beneath the THRESHOLD (q. v.).

Used by Wundt (*Physiol. Psychol.*, 3rd ed., 384), who gives the negative sensation a greater value as the stimulus continues to sink, until at zero stimulus the negative sensation is infinite, and is 'more undetectable than any other undetectable sensation.' All of which, in the opinion of some, is reine Mythologie. (J.M.B.–G.F.S.)

Negative Variation: Ger. *negative Schwankung, Actionsstrom*; Fr. *variation négative*; Ital. *variazione negativa.* Decrease of the muscle or nerve current upon tetanizing an excised muscle or nerve.

Since any portion of a muscle or nerve which is active becomes electrically negative to resting portions, the term 'action current' is to be preferred to negative variation, and has come into general use in its stead.

The phenomenon was discovered independently by Matteucci and Du Bois-Reymond, 1840–3. (C.F.H.)

Negativism: see UNKNOWABLE, and cf. AGNOSTICISM. See also PSYCHOSIS.

Negativity and **Negation** (Hegel's *Negativität* and *Negation*): see HEGEL'S TERMINOLOGY, Glossary, sub verbis.

Negligence (in law) [Lat. *negligentia*]: Ger. *Fahrlässigkeit, Nachlässigkeit*; Fr. *faute, négligence*; Ital. *negligenza.* Acting or omitting to act without due care to avoid or prevent injury to others.

Due care is that which, under the circumstances of the particular case, is required by the rules of law. It may, by one of these rules, be such care as a man of ordinary prudence in such a situation would reasonably be expected to use. To constitute *actionable negligence* there must be an obligation towards the party who claims the right of action to use care, and a breach of that obligation to his injury (Markby's *Elements of Law*, § 681; Holland, *Jurisprudence*, chap. viii. 98, 99). *Contributory negligence* is a bar to an action for negligence, and means negligence of the plaintiff materially contributing to produce the injury of which he complains. *Gross negligence* is the absence of even slight care. 'Gross negligence is not actionable where not even slight care was due. However blameworthy, it is still essentially different from intentional wrongdoing' (Beers *v.* Boston and Albany Railroad Co., 67 Conn. Law Reports, 427). Under the doctrine of *Respondeat superior*, a master may be liable for his servant's negligence, and may be liable for negligence in employing a careless or incompetent servant, by whose act another suffers.

Negligentia does not seem to have been actionable, at Roman law, unless it so infringed upon the rights of others as to constitute *culpa.* 'Magna negligentia culpa est' (*Dig.*, l. 16, *de verborum significatione*, 226). See Cushing, *Introd. to Roman Law*, § 369 ff.; Morey, *Outlines of Roman Law*, 349. (S.E.B.)

Nemesis [Gr. *νέμεσις*, from *νέμειν*, to distribute or allot]: Ger. *Nemesis*; Fr. *Némésis*; Ital. *nemesi.* In Greek thought, the principle of inevitable retribution according to the strict measure of desert; conceived at first impersonally, but later personified as a divinity.

Nemesis is distinguished from Fate, which in Greek thought has scarcely any moral significance. Nemesis is the vengeance which man brings upon himself by his own deeds. In this sense it corresponds to Karma in Hindu thought. There is no escape from Nemesis, however, whereas Hinduism points out a way of salvation. (A.T.O.)

Nemesius: see PATRISTIC PHILOSOPHY, (6), (*c*).

Neo- [Gr. *νέος*, new]: Ger. *Neo-*; Fr. *néo-*; Ital. *neo-.* New; as in neophobia, an abhorrence of anything new; neomania, a passion for novelty. (J.J.)

Neo-criticism: Ger. *Neo-Kriticismus*; Fr. *néocriticisme*; Ital. *neo-criticismo.* The revived KANTIANISM (q. v.) of the 19th century; theoretically equivalent to Neo-Kantianism, but as matter of fact used mainly for the form given to the Kantian thought in France by Renouvier, Pillon, and others. (J.D.)

Neo-Hegelianism: Ger. *Neuhegelismus*; Fr. *néo-hégélianisme*; Ital. *neo-Hegelianismo.* The revived Hegelianism of the school of thinkers represented in England by T. H. Green, J. and E. Caird, and Bosanquet, and in the United States by Morris, Harris, and Dewey.

The spirit of Hegel and the general outcome of his idealism are revived rather than the actual developments of his thought or his dialectical method. (J.M.B.)

Neo-Kantianism: Ger. *Neo-Kantian-*

ismus; Fr. *Néo-Kantisme*; Ital. *Neo-Kantianismo*. See KANTIANISM, and NEO-CRITICISM.

Neo-Lamarckism: see LAMARCKISM.

Neology [Gr. *νέος*, new, + *λόγος*, science]. Used in theology in a sense identical with RATIONALISM (q. v.). (A.T.O.)

Neophobia: see NEO-.

Neo-Platonism: Ger. *Neuplatonismus*; Fr. *néoplatonisme*; Ital. *neo-platonismo*. (1) The revival and transformation of Platonic philosophy that took place, with Alexandria as its head quarters, under the influence of oriental thought. Cf. Whittaker, *The Neo-Platonists* (1901). See PATRISTIC PHILOSOPHY (2), ALEXANDRIAN SCHOOL, and SOCRATICS (Plato).

(2) Also, the revival of Platonism that took place at Cambridge, England, in the 17th century, under the influence of Cudworth and Henry More. See CAMBRIDGE PLATONISTS. (J.D.)

Neo-Pythagoreanism: Ger. *neupythagoreische Lehre* (K.G.); Fr. *néo-Pitagoreisme*; Ital. *neo-pitagoreismo*. A system or, better, a tendency of thought which arose at Alexandria in the 1st century A.D., and which, in accordance with the tendency of the time, tried to consecrate its own teachings by identifying them with the teaching of some ancient sage.

It had its derivation from the latest period of the philosophy of Plato, in which the categories of the One, the Dyad, the Odd and Even, &c., were manipulated; and it emphasized the dualism of the Platonic metaphysic, transforming it into the basis of an ethical and religious asceticism. In connection with the latter it revived also the Pythagorean mysteries. It is of chief philosophic import because of its influence upon NEO-PLATONISM (q. v.) and, indirectly, upon Clement and Origen. Cf. PATRISTIC PHILOSOPHY. (J.D.)

Neo-vitalism: see LIFE.

Nerve [Lat. *nervus*]: see NERVOUS SYSTEM (III), and NERVE STIMULATION AND CONDUCTION.

Nerve-cell: see NERVOUS SYSTEM (II). Cf. NEUROCYTE, and NEURONE.

Nerve Stimulation and Conduction: (foreign equivalents are given under STIMULATION, and CONDUCTION). All nervous structures, whether fibres or cells, have normally the twofold property of reacting upon stimuli of suitable kinds (stimulation) and of propagating the peculiar form of molecular activity thus set up to adjacent or connected nerve elements (conduction).

It might be supposed that the cells would prove to be pre-eminently the excitable elements and the fibres the conducting members, but no such complete differentiation has taken place. Neither is it possible completely to distinguish these two processes one from the other, for the process of excitation is not different in kind from that which is propagated from one point to another in the system.

It is one of the commonest facts of nerve physiology that there is some peculiarity developed in the mature nerve-fibre which strongly tends to polarize its elements in such a way as to make more easy the passage of a stimulus in one direction than in the opposite one. It is not to be doubted that this peculiar resistance to translation of the stimulus or current the wrong way depends on some peculiarity of what is called molecular arrangement, and it is also more than probable that this structural organization is a function of the earliest activities of the axis cylinder which transform the before indifferent protoplasm into the forward-conducting nerve. The curious relation of this directive polarity of nerves to their original direction of growth is noted under NERVOUS SYSTEM (q. v., III). See also REGENERATION. The various experimental attempts to prove the power of nerves to conduct in the reverse direction suffer from the fact that all evidence shows that the union of an afferent and efferent nerve cannot take place without a regeneration of the axis cylinders beyond the lesion or point of attempted union.

In general it may be said that under favourable circumstances nearly all kinds of molar and molecular stimuli are capable of producing an effect on nervous matter. See PROTOPLASM, and LIVING MATTER.

One of the simplest means of experimental examination of the conductivity of nerves is that afforded by the so-called nerve-muscle apparatus, too well known to require description here. By varying the experiments with this apparatus it is possible to determine approximately the time required for a nerve-current to pass through a definite length of the nerve and numerous other data respecting the conductivity of the nerve. These experiments are all, of course, complicated by the fact that the current must produce a muscular contraction before a registration can be secured, and numerous variables may exist while the observer is attempting to measure one. By the use of various forms of electro-

meter nervous responses may be studied in terms of the electrical variation accompanying them. Here, too, the greatest caution is required in interpreting the results. While shock, thermal irritation, and chemical stimuli all produce nervous activity, the application of the various forms of electrical stimuli is so much more accurate and practicable that nearly all work in the study of nervous conduction is done by such means.

Du Bois-Reymond, who is the pioneer in the study of these phenomena, formulated in 1845 the statement that the excitory effect of a constant current is secured only by varying the intensity of the current; an unvarying constant current does not act as an exciter. The resistance offered by living nerve to the current is about the same as that of muscle. It is, in round numbers, 50,000,000, as great as that of copper wire, and 14·86 times that of distilled water. A current impinging on a nerve-fibre at right angles to the course of the nerve produces no effect, and the effect varies with the direction (ascending or descending), with the duration of the stimulus, the strength of the stimulus, and the length of the nerve through which it flows. The minimum time during which the current must be applied is apparently about ·0015 of a second. When one electrode is placed at the equator and the other at the cut end of a nerve, the needle of a sensitive galvanometer indicates the passage of a so-called current of rest. But now, if an interrupted current be applied to the nerve, awakening its physiological activity, the needle of the galvanometer moves backward towards zero. This 'negative variation' may be produced by any stimulus that will set up a nervous action in the fibre. The electromotive force of a nerve is thus lessened by its physiological activity, and the amount of diminution finds its measure in the negative variation. The electrical condition of each excited place in a nerve-stretch is negative to all the places in the same nerve-fibre that are not excited. Du Bois-Reymond stated that the negative variation is not a continuous lessening, but a successive rise and fall of the current.

In his early experiments (1871) Bernstein made the following points: Between the moment of stimulation of a given point in a nerve and the onset of negative variation at a given distance in that nerve a measurable time elapses. The phenomena of negative variation have also a measurable duration. The curve of negative variation rises abruptly to its maximum, but sinks more gradually. The rate of translation of the stimulus and that of the negative variation are identical. The duration of the negative variation was found to lie between ·0006 and ·0007 sec., the length of the wave being 18 mm., and the rate of translation 28 metres per second. With strong stimuli the negative variation may greatly exceed the nerve-current. The duration of a wave 10 mm. long in muscle is ·004 sec., and the rate 3 to 4 metres. In nerves the wave remains more or less constant in its passage from the point of excitation, but in muscles, because of the transformation of molecular into molar motion, the intensity of negative variation diminishes.

In 1836 Peltier described a negative polarization in the legs of a frog through which a current was passing. Du Bois-Reymond found the point where the current entered alkaline, and that where it emerged acid. It then appeared that any porous body not too poor a conductor would, under similar circumstances, exhibit this negative polarization. Matteucci in 1860 independently described the phenomena of negative polarization and termed them secondary electromotor phenomena. In addition to the negative polarization, which at first does not seem to differ from that of other porous conducting bodies, but really is somehow connected with the vital activities of the tissue, there is a positive polarization which, so far as known, is confined to nerve, muscle, and electric organs. In monomeric muscles the polarization is stronger in the direction from the equator towards the extremities than in the opposite direction, a fact dependent on the direction of normal contraction. In motor and sensory nerves the positive polarization is greatest in the direction pursued by the normal innervation. In short, in all these cases of nerve, muscle, and electric organ the direction of maximum positive polarization is that pursued by the normal physiological activity.

The attempt to measure the relation of stimulus to nerve process remains practically abortive. Hermann found that, as measured by the resulting muscle contraction, the nerve process increases, at first rapidly, and then more slowly with the increase of the stimulus. Fick sought to prove that within certain limits the relation is that of a direct proportion. There are successive maxima with intervening diminutions. Rutherford discovered that the reflex effects of stimulating

a sensory nerve are greater when the stimulus is applied near the central organ than when further removed. The speed of conduction is, as already mentioned, about 28 metres per second in the frog, while for man it is about 33·9 metres. Hirsch found the rate in sensory nerves of man 111·5 feet per second, a result more closely agreeing with the results of Helmholtz's experiments than even those of other investigators on the rate of passage in motor nerves.

Variations in temperature and in the vital condition of the nerve affect the rate of translation, as might be expected.

Kries found that the excitatory impulse of nerve on muscle is not uniform, but is subject to great variation, so that the negative variation may be much longer than that produced after instantaneous irritation, as found by Bernstein ($\frac{1}{250}$ sec.). In the frog muscle eight shocks per second produce tetanus, while in mammals a much greater number of shocks from the induction apparatus is required to produce tetanus. Loven supposed that the final result of physiological stimulation lasts much longer than that from induction shocks, and that electrical stimulation occupies an intermediate position.

Among the many causes of ambiguity attending the use of electrical stimuli in the attempt to trace the paths of normal nervous conduction and in the investigation of the laws of such action, is the occurrence from time to time of what Sherrington calls 'antidrome conduction'; that is, the conduction of electrical effects backward or in a direction contrary to the course of the normal nervous stimulus. After transection of the cerebro-spinal axis at the calamus, if the funiculus gracilis be excited by a minimal current conveyed by steel needles, movement is evoked in the hind legs of the same side, and, in like manner, excitation of the funiculus cuneatus produces motion in the corresponding fore-leg. These reactions occur even after isolation of the funiculi from the ventro-lateral structures in the medulla oblongata for a distance of 3 cm., so that the reactions are not due to the escape of current to descending tracts in the medulla. Moreover, transection of the ventro-lateral columns below does not prevent these results, while section of the dorsal columns does. Section of the dorsal roots of the regions contracting will obliterate or nearly destroy the reaction. It may be suggested that the several links of the chain of conduction are polarized, and each then acts as an irritant to the one below it, so that in effect a retrograde current is set up. These facts warrant hesitation in accepting the results of electrical stimulation as *ipso facto* identical with those of nervous excitement.

The use of the galvanometric method for localization dates from Caton, who employed it in researches made public in 1875 and 1887. By connecting points on the external surface of the cortex with the galvanometer, he found that the uninjured surface is usually positive to a section of the cortex, but that when a part of the cortex under investigation was thrown into activity a negative variation was produced. Setschenow applied a similar method to the medulla oblongata and noticed periodic variations in the resting electrical difference which he attributed to periodic changes in the functional activity of the medullary centres. Gotch and Horsley, whose researches are important in this department, began their work in 1888. About the same time A. Beck, of Cracow, and Fleischel were carrying on similar investigations. The results of the work of Gotch and Horsley may be summarized as follows: the resting electrical difference between the cut and uninjured surface was found to be, in the nerve ·01 Daniel, for the root ·025, and for the cord ·032 (in the cat), while the figures are somewhat lower for the monkey.

These values are at once lowered in some conditions, while the difference in the cord is increased after the functional activity of that organ has been aroused. The difference is also greater if the connection with the brain is unbroken. Excitatory electrical effects can be noticed in the cord as a result of the stimulation of the cortex cerebri. This excitatory state evoked by stimulation of the cortex suffers a diminution of over 80 per cent. in passing from the cord to the sciatic nerve. A marked degree of localization can be demonstrated in the spinal cord by irritating various cortical areas. The effect in the cord after irritating the corona radiata is little more than half that produced by similar irritation of the cortex, and the cord effect is four times as great as that in the nerve. While in cortex stimulating the normal condition seems to be one of unilateral discharge, the circumstances that favour the production of bilateral effects are such as bring into play the opposite cortex, cerebellum, basal structures, &c. The bilateral effects are more readily evoked by means of stimulation of the corona radiata. Indirect as well

as direct channels exist in the cord. In the monkey a larger number of direct fibres are contained in the lateral column than in the dorsal column, the reverse being the case in the cat. No evidence was obtained of crossing between the lateral columns, but evidence of a direct connection between one dorsal column and the lateral column of the same side and of a cross connection between the dorsal columns. There is no evidence of any continuous fibres in the ventral columns of the cord between the mid-dorsal and the lumbar regions in the monkey. By far the majority of afferent impulses ascend the cord on the same side as the entering root, and a small minority ascend by the dorsal column of the opposite side, while a very few ascend by the lateral column of the opposite side. The direct path of afferent impulses is located in the dorsal column of the side of the root excited. The indirect paths are in the dorsal columns of both sides and the lateral column of the side excited.

On minimal excitation of the dorsal column, impulses are freely transmitted to the dorsal roots of the same side and so into the mixed nerve. With maximal excitations the impulses are similarly transmitted through the indirect paths. On maximal excitation of the dorsal column, impulses are transmitted by indirect paths across to the dorsal roots of the opposite side. On excitation of the lateral column, impulses are directly transmitted to the mixed nerve of the same side. There is a complete obstruction to all centripetal impulses that may reach the cord by the central end of the ventral roots. A marked quantitative diminution as well as delay in time is suffered by impulses which leave the spinal cord by the ventral roots.

Literature: S. Apáthy, Ueber Neurofibrillen und über ihre nervöse leitende Natur, Proc. Fourth Int. Cong. Zool. (Cambridge, 1899); A. Beck, Centralbl. f. Physiol., Nov., 1890; J. Bernstein, Untersuch. ü. d. Erregungsvorgang im Nerven- u. Muskelsysteme (Heidelberg, 1871); Ueber den zeitlichen Verlauf der negativen Schwankung des Nervenstromes, Pflüger's Arch., i. 173; Zur Konstitution und Reizleitung der lebenden Substanz, Biol. Centralbl., xix (1899); W. Biedermann, Sitzber. Akad. Wiss. Wien (1879 to 1885 and 1888); Electrophysiologie (Jena, 1895; Eng. trans., London, 1896; contains full review of literature); E. du Bois-Reymond, Ueber secundär-electromotorische Erscheinungen, Arch. f. Physiol. (1884); Untersuch. ü. thierische Electricität; Ueber die Geschwindigkeit des Nervenprincips, Centralbl. f. Physiol., Dec., 1899; Caton, Brit. Med. J. (1875); Trans. Ninth Med. Cong. (1887); Cybulski and Sosnowski, Die negative Schwankung, Centralbl. f. Physiol., xiii (1899); Danilewsky, Centralbl. f. Physiol., April, 1891; Exner, Pflüger's Arch., vii; Ernst Fleischl, Centralbl. f. Physiol., Nov., 1890; Foster, Textbook of Physiol.; Gotch and Horsley, Mammalian Nervous System, Croonian Lecture, 1891; R. Heidenhain, Physiol. Stud. (Berlin, 1856); Helmholtz, Arch. f. Anat. u. Physiol. (1850); Hermann, Handb. d. Physiol. (1879); A. Herzen, Centralbl. f. Physiol., xiii (1899); Alex. v. Humboldt, Versuche ü. die gereizte Muskel- u. Nervenfaser (Berlin, 1797); Kühne, Arch. f. Anat. u. Physiol., &c. (1859), 595; F. W. Mott and C. S. Sherrington, Experiments upon the Influence of Sensory Nerves upon Movement and Nutrition of the Limbs, Proc. Roy. Soc., lvii. 345 (May, 1895); Johannes Müller, Handb. d. Physiol.; Pflüger, Ueber d. sensorischen Functionen d. Rückenmarks (Berlin, 1853); Untersuch. ü. die Physiol. d. Electrotonus (Berlin, 1859); J. Rosenthal, Allg. Physiol. d. Muskeln u. Nerven (2nd ed., Leipzig, 1899); Rutherford, J. of Anat. and Physiol. (1871); Setschenow, Pflüger's Arch., xxv (1881); C. S. Sherrington, Double (Antidrome) Conduction in the Central Nervous System, Proc. Roy. Soc., lxi. 373 (1897); Vintschau, Pflüger's Arch. (1883); Vulpian, Leçons sur la Physiol. du Syst. nerv.; A. D. Waller, The Characteristic of Nerve, J. of Physiol., xxiv (1899); cf. also Proc. Roy. Soc., lxv (1899); G. Weiss, Influence d'une légère traction sur l'excitabilité du nerf, C. R. Acad. d. Sci., cxxviii (1899); Wilhelm Wundt, Die Lehre v. d. Muskelbewegung (Braunschweig, 1858); Untersuch. z. Mechanik d. Nerven (1876); and Grundzüge d. physiol. Psychol. (Leipzig, 4th ed., 1893). (H.H.)

Nervous Disease: see Neurosis, and the various special names of nervous disorders. Cf. Psychosis, and Pathology (mental).

Nervous System: Ger. *Nervensystem*; Fr. *système nerveux*; Ital. *sistema nervoso*. The totality of the excitatory and responsive organs of an animal body, including all structures serving to receive, transmit, coordinate, and respond to external or internal stimuli or to form the initiative for voluntary functions.

[Treatment.—This article comprises the following sections: I. Comparative Anatomy and Phylogeny. II. Histology and Histogenesis. III. Structure, including Nerves, Cranial Nerves, Spinal Nerves, and Sympathetic System; together with bibliographies appended to the various sections.]

I. *Comparative Anatomy and Phylogeny.* In the Protozoa there is no differentiated nervous system, the fundamental nervous function —IRRITABILITY (q. v.)—being diffuse. In Sponges, though they are little more than colonies of protozoans, a few instances (Dendrilla, &c.) are known where definitive nerve-cells and sense-organs occur. In Coelenterata for the first time a well-developed nervous system appears, though the nervous function is not entirely concentrated within it. Especially interesting are the variations in the nervous

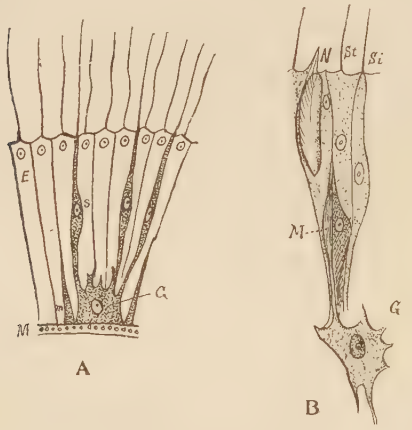


Fig. 1. A, Inner layer of mouth funnel of Lamiaria. *M*, muscles; *m*, muscle body; *E*, supporting cell; *s*, sensory cell; *G*, ganglion cell.
B, Part of head of Plumularia. *M*, muscle fibre; *N*, nematocyst; *St*, ordinary ectoderm cell; *Si*, sensory cell; *G*, ganglion cell. (After v. Lendenfeld.)

system in different individuals of the colonies of Hydroids, consisting of nutritive individuals, blastostyles, and medusae. See Fig. 1.

In the flat worms (Planaria) the nervous system has completed its separation from the external epithelium, and a certain degree of concentration is evidenced by the formation of a ganglion above the oesophagus, and the localization of two among the many radial trunks to correspond with a bilateral symmetry in the body. In higher groups of Vermes the simple scheme outlined in Planaria undergoes infinite variation, until, in the Annulata, the ventral double chain is segmented to correspond with the jointed body. Each ventral ganglion gives off a number of fibres supplying the muscles, skin, and sense-organs of that segment. Especially characteristic of annulates are the so-called neurochord fibres arising in the cephalic ganglia and passing through the entire length of the cord. They spring from giant nerve-cells, and resemble the similar bodies in the spinal cord of fishes. The arthropods elaborate the neural plan laid down in the Vermes.

The brains of lower vertebrates not only serve as simplified diagrams to explain the complex structure of the human brain, but afford hints as to the course pursued in its evolution. In Amphioxus we have at once the lowest existing type and a degenerate condition of the vertebrate nervous system. See Plate A (NERVOUS SYSTEM), Fig. 1. Here the cephalic portion of the nerve-tube is expanded, and indications of the three embryonic vesicles appear. The first of these forms a ventricle provided with an infundibulum connected with the olfactory apparatus. In the Petromyzontidae a marked advance upon the condition just described is reached. Here rudimentary hemispheres are developed, though they seem to be almost wholly concerned with data from the olfactory sense. The dorsal system of sense-organs (epiphysial system) is remarkably developed, suggesting a probable functional condition prior to the differentiation of lateral eyes. See PARIETAL ORGAN. The brain of selachians differs from that of higher vertebrates, in that no true lateral ventricles are formed. The lung fishes, although deviating less from the main line of evolution, are in some respects higher than sharks. The ganoids are still more specialized, forming a transition to the bony fishes. The cephalic end of the brain-tube connects with the ectoderm in an embryonic period, and the neuropore so formed is closely related with the rudiment of the hypophysis. In spite of great diversity otherwise, all bony fishes agree in lacking the cortex cerebri, and such nervous elements as substitute for that structure remain in the axial lobe. A dorsal membranous pallium covers the ventricles and aula, and includes the representatives of the plexus. The roof of the aula is distended to form a large dorsal sac. The infundibular region is also distended to form a saccus vasculosus near the mammillary bodies. Enormous massive protuberances from the pes pedunculi region constitute the hypoaria. The cerebellum is enormously developed, and a special portion, or volvula, is

PLATE A (**Nervous System**).

Figures illustrating the relative development of various segments of the neural tube in the adult brain of various groups of vertebrates. (After Burckhardt.)

I.	Medisection of brain of			Amphioxus.
II.	,,	,,	,,	Petromyzon.
III.	,,	,,	,,	sturgeon.
IV.	,,	,,	,,	Hexanthus.
V.	,,	,,	,,	a lizard.
VI.	,,	,,	,,	an (embryonic) bird
VII.	,,	,,	,,	man.

thrust into the unobliterated cavity of the mesencephalon. In addition to the cerebellum, other outgrowths from the medulla usurp positions in its roof, and these depend on the preponderance of one or another of the cranial nerve nuclei.

In amphibians the various regions of the brain depart very little from the primitive and embryological conditions. In the tailed forms especially the arrangement of the cells is essentially similar in the various segments, and the functional representatives of the several nuclei are scarcely segregated, but occupy the primitive position near the ventricles. Nevertheless in the Amphibia and reptiles distinct cortical centres develop, especially those for construing olfactory stimuli. Reptiles may be said to represent the middle point in the development of the brain. The functional persistence of the parietal eye is an important feature in some lizards. In birds the most noteworthy features are the excessive compactness and the emphasis on all parts connected with vision and locomotion. The relative size and configuration of the hemispheres has been successfully used in classification of the minor groups.

In all these groups a common structural plan appears in the midst of conflicting tendencies (cf. BRAIN). The figures from Burckhardt (Plate A, Nervous System) may serve instead of further verbal comparisons.

Literature: L. EDINGER, Vorlesungen ü. den Bau d. nervösen Centralorgane des Menschen u. d. Thiere (5th ed., 1896; trans. by Hall, Philadelphia, 1899); R. WIEDERSHEIM, Grundriss d. vergleichenden Anat. d. Wirbelthiere (3rd ed., Jena, 1893), 230–367; R. BURCKHARDT, Der Bauplan des Wirbelthiergehirns, Schwalbe's Morphol. Arb. (Jena), iv. No. 2; C. L. HERRICK, Nervous System, Wood's Ref. Handb. of the Med. Sci., ix. Suppl. (1893); C. GEGENBAUR, Vergleichende Anatomie d. Wirbelthiere, i (Leipzig, 1898); GAUPP's revision of Echer's Anatomie des Frosches (Braunschweig, 1899); FLATEAU and JACOBSOHN, Handb. d. Anat. u. vergleichenden Anat. des Centralnervensystems d. Säugetiere, I. Makroskopischer Teil (Berlin, 1899); GOLGI, Sulla fina struttura del sistema nervoso, Riv. di Freniat. (1875 ff.); and Rech. sur l'histologie des centres nerveux, Arch. Ital. de Biol. (1882–91). For the current literature consult especially the Bericht über die Leistungen auf dem Gebiet der Anatomie des Centralnervensystems, published annually by EDINGER in Schmidt's Jahrbücher. This contains critical summaries of the more important papers in Comparative Neurology.

II. *Histology and Histogenesis.* The essential functional element of the nervous system is the nerve-cell (neurone or neurocyte) with its various appendages (see Fig. 2).

The nerve-fibre is simply a process or prolongation of the neurocyte or the product of the fusion of a number of such elements. A typical neurocyte consists of a cell-body, containing nucleus, nucleoli, pigmented and unpigmented protoplasm, and giving off at least two varieties of processes. One of these, which is usually the conveyer of cellifugal stimuli, is the neurite, 'axon,' or 'axis-cylinder process'; the others, usually more ramose, and conveyers of cellipetal stimuli, are the dendrites, or 'protoplasmic processes.' When a neurite soon breaks up without extending far from its origin, it is termed a neuropodium.

Fig. 2. A nerve-cell. (From Nansen.) *m.p.*, mixed process, or neurite; *pp*, dendrites; *v*, transected tubules; *cm*, cell sheath; *a*, cavity between sheath and cell filled with reticular stroma.

When a cell has but a single variety of processes it is called homoipodal, as contrasted to heteropodal. The ganglion cells, e. g. of the spinal ganglia, are illustrations of homoipodal nerve-cells. In these cases the cellifugal and cellipetal processes have fused for a certain distance from the cell-body. The specific cells of the olfactory sensory organs afford good illustrations of unipolar cells, though it must be remembered that, in this case, the term is used in a morphological, not a physiological sense.

Some cells of the sympathetic ganglia form a peculiar type of unipolar neurocyte, in which the cell gives rise to a non-medullated fibre, and its body is surrounded by a dense network derived from a distinct fibre (Figs. 14 and 15). Heteropodal neurocytes are more generally distributed, forming the majority of functional nervous elements. Two main classes are distinguished: viz. type I, in

which the neurite passes without interruption into a nerve-fibre, and type II, in which the neurite almost immediately subdivides in arborizations. Type I is best seen in the motor regions of the spinal cord. Type II is seen in sensory regions of the cortex, in the cerebellum, and in the retina.

Under most circumstances neurocytes are serially independent anatomically, i. e. do not actually come into contact with each other, thus insuring a certain insulation and rendering possible—it may be conjectured—a 'threshold' of discharge or an initial resistance. Cf. CONCATENATION (neural). In certain cases it would seem that there is lateral continuity among processes of cells of

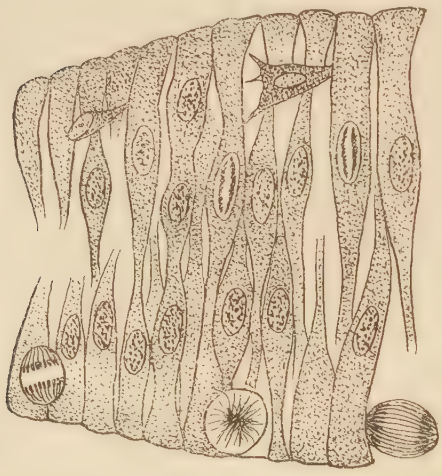


Fig. 3. Portion of the mesencephalon of garter snake embryo. Neuroblastic nuclei in division near the ventricle; spongioblasts, some of which are also dividing; older neuroblast near the surface.

the same order (Dogiel). So in the retina and sensory elements of the skin, especially of the external genitalia. The perikaryon or cell-body and the neurite or fibre taken together make up the neural unit of structure called the NEURONE (q. v.), or neurocyte.

The method of development of the nervous elements is remarkably constant. The neuro-epithelium of central or peripheral areas is at first composed of a single layer. At a very early period two classes of elements (neuroblasts and spongioblasts) are differentiated, the former passing through a variety of changes of form and position until prepared to function as adult nerve-cells, the latter remaining to constitute a portion of the framework of the structure. The neuroblasts and spongioblasts both retain the power of subdivision for some time, providing for growth by proliferation. In many portions of the central nervous system special groups of neuroblasts are formed, which serve as germinative or proliferating nuclei. In other cases, as in that of the olives and cerebellum, the neuro-epithelium itself forms invaginated or evaginated pouches, whence proliferating elements take their origin for the upbuilding of an organ. In the cerebellum, at an early stage, a transitory layer of neuroblasts is thus formed upon the ectal surface, from which the deeper layers are formed by a species of cell migration. See Figs. 3, 4, 5.

The same process occurs elsewhere in the brain, and it is probable that cells capable of proliferation are present as reserves up to a late period.

The simplest form of connection between peripheral and central elements found among vertebrates is illustrated by the olfactory connections (Fig. 6). The receptive cell (*o*) transmits its impulse along the neurite (*n'*) to the olfactory glomerule (*gl.*) in the olfactory bulb. Here it passes over into the second nerve-unit, and thence via the neurite (*n''*) to the olfactory centres of the cortex. A more highly differentiated condition is found in the sensory nerves of the skin. See SPINAL CORD, Figs. 2 and 4. Here the cell-body of the first neurocyte has been removed from the surface to the spinal ganglion, and the central termini are much more complicated. These instances may be taken as typical intercellular relations.

Literature: STEFAN APÁTHY, Das leitende Element des Nervensystems und seine topographischen Beziehungen zu den Zellen, Erste Mitt., Mitt. aus der Zool. Station zu Neapel, xii. 4 (1897); LEWELLYN F. BARKER, The Nerv. Syst. and its Constituent Neurones (New York, 1899); RAMON Y CAJAL, Nuevo Concepto de la Histologia de los Centros Nerviosos (Barcelona, 1893; French trans., 1894; German trans., Arch. f. Anat. u. Physiol., Anat. Abth., 1893); A. S. DOGIEL, Zur Frage über das Verhalten der Nervenzellen zu einander, Arch. f. Anat. u. Physiol., Anat. Abth. (1893); also Die Nervendigungen in den äusseren Genitalorganen des Menschen, Arch. f. mikr. Anat., xli. 4, and numerous other papers in the latter periodical (1891–7); A. VAN GEHUCHTEN, Des Découvertes récentes dans l'Anatomie et l'Histologie du Système nerveux central (1891); C. L. HERRICK, Nervous System, Histogenesis of

Fig. 4.

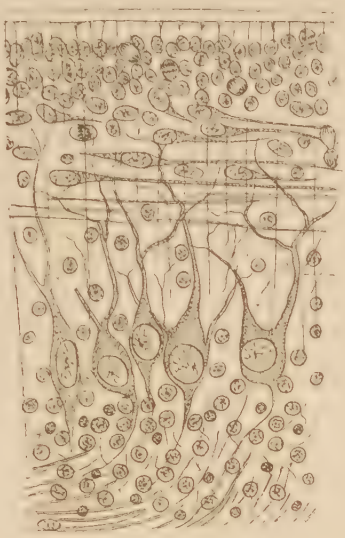


Fig. 5.

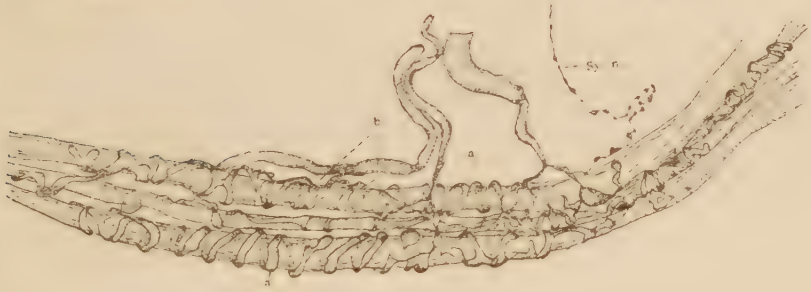


Fig. 7

Fig. 6.

Fig. 8.

Fig. 4. Portion of the tectum opticum of the snake with neuroblasts already provided with well-developed neurites and small dendrites. *Ne*, neuroblast; *Sp*, spongioblast.

Fig. 5. Cortex of the cerebellum in the opossum embryo.

Fig. 6. Diagram of olfactory connections.

Fig. 7. Muscle-spindle, from the intrinsic plantar muscles of a dog. Three spindle nerves and their endings (*a*, *b*) are shown, and also a sympathetic nerve which enters the spindle, *Sym.* (After Huber.)

Fig. 8. Motor nerve-ending upon an involuntary, smooth muscular fibre, from the muscular wall of the intestine of a cat. *a*, the axis cylinder terminating; *b*, the termination; *n*, nucleus of the muscle cell. (After Huber.)

its Elements, Wood's Ref. Handb. of the Med. Sci., ix, Suppl. (1893); also Illustrations of the Architectonic of Cerebellum, J. of Compar. Neurol., i (1891); W. His, Histogenese und Zusammenhang der Nervenelemente, Arch. f. Anat. u. Physiol., Anat. Abth. (1891), Suppl.-Bd.; A. Kölliker, Handb. d. Gewebelehre des Menschen, ii (6th ed., 1893–6); M. v. Lenhossék, Der feinere Bau des Nervensystems im Lichte neuester Forschungen (1893); H. Obersteiner, Die neueren Anschauungen über den Aufbau des Nervensystems, Naturwiss. Rundschau, trans. in J. of Compar. Neurol., ii (May, 1892); B. Onuf, The Biological and Morphological Constitution of Ganglionic Cells as influenced by Section of the Spinal Nerve Roots or Spinal Nerves, to which is added Some Remarks on Localization, J. of Nerv. and Ment. Dis., xx (1895); Starr, Strong, and Leaming, Atlas of Nerve Cells (1896); W. Waldeyer, Ueber einige neuere Forschungen im Gebiete der Anatomie des Centralnervensystems, Deutsche med. Wochensch. (1891), No. 44 ff.; A. Bethe, Ueber die Primitivfibrillen in den Ganglienzellen vom Menschen und anderen Wirbelthieren, Morphol. Arb. von Schwalbe, viii. 95 (1898); A. Meyer, Critical Review of the Data and General Methods and Deductions of Modern Neurology, J. of Compar. Neurol. (1898); F. Nissl, Nervenzellen und graue Substanz, Münch. med. Wochensch. (1898); A. Schaper, Die frühesten Differenzirungsvorgänge im Centralnervensystem: kritische Studie und Versuch einer Geschichte der Entwickelung nervöser Substanz, Arch. f. Entwicklungsmech., v (1897); Lugaro, in Riv. di Patol. nerv., i–iii (1896–8), passim. See also the works cited elsewhere in this article, and under Brain.

III. *Structure*:

A. Central Nervous System. See Brain, and Spinal Cord.

B. Peripheral Nervous System.

1. Dermal and Special Sense Organs. See Sense Organs.

2. Nerves.

Nerve: a bundle of nerve-fibres, together with the sheaths and connectives. Each nerve-fibre is an outgrowth of some neurocyte or ganglion cell or the product of fusion of a moniliform series of such outgrowths. See Concatenation.

The essential portion of each nerve-fibre is the axis cylinder, a slender protoplasmic cord composed of a denser fibrillary framework and a semi-gelatinous stroma. The axis cylinder is simply the extreme development of a process from a nerve-cell. As it leaves the parent cell the axis cylinder is naked, but it may soon become clothed with a medullary sheath, and as it leaves the central system it acquires the dense homogeneous sheath of Schwann. At the terminus of each nerve the sheath is again lost, and the naked axis cylinder comes in contact with the end-organ. The sheaths serve the double purpose of insulation and protection. Non-medullated nerves occur chiefly in the sympathetic system of mammals, but are more widely distributed in lower types. The non-medullated condition is the primitive one, and occurs in nearly all nerves of invertebrates and the lowest vertebrates (Amphioxus and Cyclostomata).

Each medullated nerve-fibre is divided into segments, each of which has its own nucleus (Ranvier's nodes). Phenomena of regeneration and development seem to indicate (contrary, however, to the statements of Kölliker) that each node represents a nervous element or cell, whose protoplasmic outgrowth (axis cylinder) has united with its neighbour in both directions. When the fibre is separated from its trophic centre, these nuclei proliferate and regenerate the fibre, supplying local trophic centres until the connection is re-established. The nodes also appear prior to or in the absence of the sheath of Schwann. A second obscure fragmentation of the myelin sheath gives rise to the Schmidt-Lantermann incisions, but these are probably artifacts.

Each nerve bundle is held together by an intrinsic connective system (endoneurium), and each bundle is covered by its epineurium. The sheath of the nerve as a whole constitutes its perineurium. See Fig. 12.

Motor nerve-fibres arise from neurocytes within the neuraxis and are thus prolongations of their neurites. Sensory fibres arise from the dendrites of the ganglion cells of the spinal or cranial ganglia, while the neurites of the latter enter the neuraxis, there to arborize about the cells of the terminal nuclei. The growth in each case pursues the direction of the normal nervous transmission. Cf. Waller's Law.

To the law that nerves conduct only in the direction of original growth there are exceptions, as in the case of the peripheral process of the spinal ganglion cells and as in cases where a sensory nerve has been grafted upon a motor trunk, and vice versa. The latter cases are probably to be explained on the supposition that the peripheral portion under-

goes the characteristic DEGENERATION (q. v.), and, in regenerating, assumes the required properties.

Nerves are acted upon by mechanical, thermal, chemical, and electrical stimuli, though it is probable that each such irritant is converted into a common type of stimulus before it is translated through the nerve substance. The nature of the physiological or normal stimulus is still unknown (cf. END-ORGAN). The degree of excitability is largely dependent on the nutrition or the metabolic state. That which is frequently included under the term temperament (largely metabolic predisposition) probably has much influence.

The termini of motor nerve-fibres upon the muscle assume a variety of forms. The naked axis cylinder frequently branches extensively at its extremity, and even where definite end-plates are formed (Fig. 10), proper methods demonstrate similar ramifications among the nuclei (Fig. 11), which correspond to the terminal arborization of the motor nerve. See also Figs. 8, 9. Among the muscle-fibres a few of smaller size are found, usually in groups of several together, enclosed in a special connective-tissue sheath. The muscle-spindle, as such special muscle bundles are termed, is undoubtedly a sensory organ, and its fibres are supplied by nerve-fibres, which arise from the dorsal roots of the spinal nerves. Their peculiar spiral endings are shown in Fig. 7. The tendon is supplied with a special end-organ consisting of numerous fine branches. For the relations of the nerve roots see SPINAL CORD.

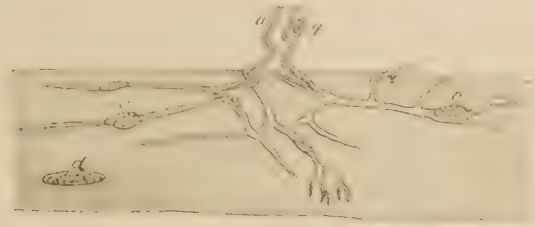


Fig. 9.

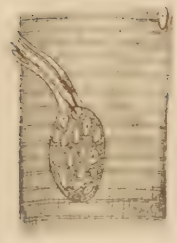


Fig. 10.

Fig. 11.

Fig. 12.

Fig. 9. Nerve termini in muscle of frog (Kölliker). *a*, sheath; *c*, nuclei of terminal fibrils; *d*, nucleus of muscle-fibre; *g*, nucleus of nerve-fibre.

Fig. 10. Nerve terminus (motor plate) in the rat (Kölliker).

Fig. 11. Similar end-plate treated with gold chloride, showing the terminal arborizations (Kölliker).

Fig. 12. *a*, Single nerve-fibre with a Ranvier's node; *b*, sheath of Schwann; *c*, its nuclei; *d*, incisions of Lanterman; *e*, the medullary sheath; *f*, axis cylinder.

Literature: A. v. KÖLLIKER, Gewebelehre des Menschen, ii. Pt. I (1893); E. A. SCHÄFER, Histology of the Nerves, in Quain's Anatomy, i. Pt. II (10th ed., London and New York, 1895, with bibliography); L. GEDOELST, Étude sur la Constitution cellulaire de la Fibre nerveuse, La Cellule, iii (1887; contains a bibliography of 269 titles); also Nouvelles Recherches sur la Constitution de la Fibre nerveuse, La Cellule, v (1889); J. BEARD, The Development of the Peripheral

Nervous System of Vertebrates, Quart. J. of Microsc. Sci., Oct., 1888; C. L. Herrick, J. of Compar. Neurol., iii (March, 1893); Axel Key and Retzius, Studien in der Anatomie des Nervensystems und des Bindegewebes (Stockholm, 1875), 2 vols. folio; also Arch. f. mikr. Anat., ix (1873); L. Ranvier, Leçons sur l'Histol. du Syst. nerveux (1878); A. Charpentier, Arch. de Physiol., [5] vi. 4. 792; G. Carl Huber and Lydia De Witt, J. of Compar. Neurol., vii. Nos. 3 and 4 (1898), 169; also ibid., x. 160 (1900).

Cranial Nerves. The first twelve pairs of nerves leaving the central nervous system, and in higher vertebrates all emerging through special foramina in the skull. The last cranial nerves resemble the spinal nerves. This resemblance diminishes as we pass cephalad, yet there is little doubt that all cranial nerves have been differentiated from a similar primitive condition. There is, however, as yet no agreement as to the number of primitive segmental nerves represented in the head.

The current numerical designations, as given below (those of Sömmering, 1778), are highly unsatisfactory, though a better system has not yet been developed. The basis for a more philosophical classification is to be sought in the study of the components of the several nerves as determined by their central connections and peripheral distribution. All nerves arising from the same or homologous centres, and distributing to homologous peripheral organs, may be regarded as constituting a single system. In higher vertebrates, at least, there is no nerve which contains all of the components, and it is not necessary to assume that they were all contained in the primitive segmental nerve.

Gaskell has made an analysis of the nerves, in which he distinguishes five groups. His system is very suggestive, and affords a basis for further research. The reader is referred to his papers for the details (see the works cited below). Its most valuable feature is the analysis of the motor cranial nerve-nuclei into somatic (XII, VI, IV, III) and visceral (XI, X, IX, VII, V), a distinction based on structural, physiological, and embryological data (cf. *Spinal Nerves*, below). A more sure basis for the components has been laid, however, by their study in the lower vertebrates. They have been already worked out for some of the amphibians and fishes (O. S. Strong, 1895, et al.). The following systems of components are known in these forms, and there are probably others: (1) The general cutaneous system (corresponding to Gaskell's somatic sensory, in part). Sensory fibres carrying tactile and other general sensory impressions from the skin to the brain and terminating in the spinal trigeminal tract, which is the continuation into the medulla of the dorsal cornua of the spinal cord. The spinal trigeminus is not only a tract of fibres, but it contains cells scattered through it. These cells constitute the upper and lower sensory nuclei of the trigeminus. In the trunk this component is undoubtedly represented by most of the fibres of the dorsal roots of the spinal nerves. (2) The communis system. Sensory fibres carrying certain visceral and other special sensations (taste, &c.), often from more or less highly specialized organs (end-buds), and passing by way of the fasciculus communis of the medulla oblongata (fasc. solitarius of man) to the chief vagus nucleus or its equivalents (lobus facialis and lobus vagi of fishes). (3) The acustico-lateral system. Sensory fibres from the neuromasts, or sensory organs of the lateral line canals of fishes, and from the organs of the internal ear, which have probably been derived from the lateral line organs. In higher (amniote) vertebrates this system is represented only by the auditory nerve. The fibres pass into the tuberculum acusticum of the medulla, a cluster of cells which, in lower forms at least, is intimately related to the cerebellum. It lies further dorsally than any of the other systems, and, unlike the general cutaneous, it seems to have no homologue in the spinal cord. Finally, the motor systems. Of these there are probably at least two, innervating (4) the somatic or body muscles, and (5) the visceral muscles respectively. They arise from the motor nuclei of the medulla. The fourth system is derived from the ventral cornua of the spinal cord or the cranial nuclei corresponding to them; the fifth probably from the lateral cornu or its equivalents in the medulla. The olfactory and optic nerves cannot as yet be placed in any of these groups. In man the same general relations of components undoubtedly prevail, though with great variation in the details, the chief difference being the absence of the acustico-lateral component in the VII and X nerves, correlated with the loss of the lateral line organs. The accompanying figure (13) illustrates their relations, so far as known, in fishes and amphibians. The XI and XII nerves in these forms are not completely differentiated.

I. *Olfactory Nerve.* The specific nerve

of smell. It exhibits numerous important differences from the other cranial nerves, especially in that its fibres lack the medullary sheath, and are in direct protoplasmic continuity with their peripheral receptive organs, the sensory cells of the olfactory epithelium. A further difference from other sensory nerves is the apparent lack of a root ganglion. It has been suggested that this ganglion is represented by the olfactory cells of the nasal membrane, which have retained the primitive position in the skin in which they are found in some invertebrates. Centrally, the olfactory fibres break up into terminal arborizations in the glomerulae of the olfactory lobe, and here connect with other systems of fibres, which bring the glomerulae into relation with the cortical centres for smell in the hippocampal regions (see Fig. 6).

II. *Optic Nerve.* The nerve to the lateral functional eyes of vertebrates. (For parietal

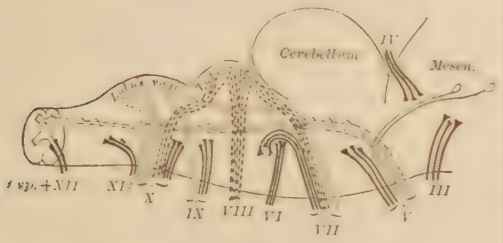


Fig. 13. Schema of the components of the cranial nerves of fishes. The somatic-motor and viscero-motor systems (see above) are not separately designated.

General cutaneous system, – – – –
Fasciculus communis system,
Acustico-lateral system, · · · · · · · ·
Motor systems, — – – —

nerve to the median eye see PARIETAL ORGAN, and EPIPHYSIS.) The peculiar relations of the retina to the brain give to the optic nerve a very special significance. In fact, it is not a nerve at all, in the strict sense of the term. The protons of the eyes having developed on the cephalic plate of the embryo before the closure of the medullary tube, they, together with the corresponding ganglia, are included by the invagination of the cephalic plate, and come to lie in the walls of the primary forebrain. This is their permanent position in the ascidians and Amphioxus, but in craniate vertebrates end-organs and ganglia are evaginated to form the optic vesicle from which the retina ultimately develops. The embryonic optic nerve is at first a tubular prolongation of the first cerebral vesicle. The optic fibres grow into it at a later period. Throughout life, in certain amphibia, it retains its lumen and spongioblastic framework like the brain proper. The cells of the third, or ganglionic, layer of the retina represent, perhaps, the root ganglion. From these cells most of the optic fibres arise and grow towards the brain, though a smaller number seem to grow in the opposite direction from brain to retina, there ending in free arborizations in the deeper retinal layers. These latter fibres probably transmit impulses centrifugally to the retina. In animals with eyes so placed that the field of vision of one eye does not overlap that of the other eye, the optic nerves cross completely in the chiasma before entering the brain. In other cases, as in man, fibres from that portion of the retina whose impressions come from objects on the opposite side of the body do not, like the other fibres, cross in the chiasma. In the lower vertebrates the fibres of the optic nerve pursue a perfectly simple course through the chiasma and optic tracts to end in the superficial layers of the tectum opticum. Those fibres which end free in the retina arise from cells which lie in the tectum. Connections with the cerebrum are effected by means of the brachia, corpus geniculatum, and optic radiations. In mammals the general plan is the same, though complicated by connections of the optic tracts with the corpus geniculatum externum and the pulvinar, as well as with the tectum.

III. *Oculomotor Nerve.* The motor nerve for the rectus superior, rectus inferior, rectus internus, and obliquus inferior muscles of the eye. Its nucleus of origin lies in the floor of the aqueduct of Sylvius. Its fibres run to the ventral surface of the brain and emerge on the mesal aspect of the crus cerebri. They are chiefly motor, though Sherrington has shown that both the III and IV roots also contain sensory fibres which serve the 'muscle sense.' Peripherally they come into relation with the ciliary ganglion and the sensory fibres of the trigeminus and sympathetic.

IV. *Trochlear or Pathetic Nerve.* The motor nerve to the superior oblique muscle of the eye. Its nucleus of origin lies in the floor of the aqueduct immediately behind that of the oculomotor. The fibres take a dorsal course and cross in the brain roof (the valvula) just cephalad of the cerebellum.

V. *Trigeminal or Trifacial Nerve.* The largest of the cranial nerves. It supplies the muscles of mastication and the general sense-organs of the face and teeth. It arises by two roots. The portio minor, or motor root, springs

from two groups of cells, one lying dorsally of the exit of the nerve from the medulla oblongata. A smaller number of fibres arise in an elongated cluster of large cells arranged sparsely along the side of the aqueduct, and constitute the descending, or mesencephalic, root. The portio major is a complex structure, chiefly sensory. Most of the fibres go to the spinal trigeminal tract and terminate in cells lying in its path (including the 'chief sensory nucleus of the trigeminus'), and are, therefore, homologous with those of the dorsal roots of the spinal nerves. These supply the general cutaneous sense organs of the face (first component). Other fibres are said to enter the cerebellum. The fibres of the portio major before leaving the cranium enter the Gasserian ganglion, of whose cells they are the neurites and from which they emerge in three branches, the ophthalmic, maxillary, and mandibular rami. The fibres of the portio minor pass by the Gasserian ganglion and enter the mandibular nerve. The ophthalmic nerve (exclusively sensory) sends small filaments to the third, fourth, and sixth nerves, to the ciliary ganglion, and from the latter to the ciliary nerves of the eye. The remaining fibres distribute to the dura mater, nose, eyelids, and skin of the forehead. The maxillary nerve also communicates with a small ganglion, the spheno-palatine, and supplies the integument of the side of the face, the upper teeth, and parts of the lining membranes of the nose and mouth. The mandibular nerve communicates with the submaxillary and the otic ganglia, and sends motor branches to the muscles of mastication, and sensory branches to the lower part of the face, to the tongue, mucous membrane of mouth, lower teeth, salivary glands, &c.

VI. *Abducens Nerve.* This purely motor nerve arises from a nucleus in the floor of the fourth ventricle, and passes ventrally to its superficial origin on the caudal edge of the pons. It innervates the external rectus muscle of the eyeball.

VII. *Facial Nerve.* A mixed nerve, arising in two portions. Most of the fibres are motor, and come from a nucleus lying ventrally and slightly caudally of that of the sixth nerve. The fibres curve around the latter, forming the genu of the facial, then directly ventrad in a compact bundle. After emergence from the brain they are joined by the much smaller portio intermedia from the fasciculus solitarius (or fasc. communis—second component). These are sensory fibres and are provided with a ganglion (geniculate g.). They communicate by means of the chorda tympani with the submaxillary ganglion and the lingual nerve of the trigeminus, and supply taste-buds of the tip of the tongue. The larger (motor) component of the seventh nerve supplies the muscles of expression of the face. The facial nerve is said by Edinger to receive some general cutaneous fibres from the first component (spinal V tract). In fishes and amphibians the seventh nerve receives also a large contingent from the acustico-lateral system.

The cortical connections of the third to seventh nerves are not thoroughly understood. There is, however, abundant evidence that the sensory components are all in more or less direct connection with the fillet (and hence with all the higher sensory centres), and the motor with the pyramids.

VIII. *Auditory or Acoustic Nerve.* Our knowledge of this nerve is in a most unsatisfactory state. The anatomical and functional relations of the several roots in man are still largely matters of controversy. In lower vertebrates the auditory nerves and the nerves of the lateral line terminate together in the tuberculum acusticum (see Fig. 13). In terrestrial amphibians (frog) the lateral line system disappears, and the auditory fibres end in two groups of cells lying dorsally of the superficial origin of the nerve, the tuberculum acusticum. The intimate relation of the auditory to the lateral line nerve is not confined to their central connections; but the membranous ear is probably a more highly specialized portion of the original lateral line canal system. The eighth nerve has two branches, the ventral, or vestibular, and the dorsal, or cochlear. The vestibular ramus supplies the macula acustica utriculi and the superior and external ampullary organs, and carries a ganglion (vestibular g.). The cochlear ramus supplies the macula sacculi, the posterior ampullary organ, and the cochlea. It, too, bears a ganglion (spiral ganglion). The two rami remain distinct to their terminal nuclei in the medulla, the vestibular ramus passing, for the most part, directly to a dorsal nucleus in the floor of the fourth ventricle, and the cochlear ramus into the ventral cochlear nucleus. Some fibres pass through this nucleus, externally and dorsally of the restiform body, to form the striae medullares in the floor of the fourth ventricle; others along the ventral wall of the medulla (trapezoid body) to the superior olives. The

fibres of the cochlear ramus enter by devious courses into relations with the lateral lemniscus, and through the latter with the postgeminum, geniculatum mediale, and temporal lobe of the cerebral cortex. The vestibular ramus communicates directly with the cerebellum. In man the dorsal (cochlear) ramus is clearly the one chiefly concerned with audition. In the lower vertebrates there is no anatomical evidence that the utricular ramus differs in any way from the saccular. The vestibular fibres are regarded by many as serving the function of equilibration rather than audition.

IX. *Glossopharyngeal Nerve.* This nerve is intimately related to the tenth. It contains three elements: viz. (1) sensory fibres of taste, terminating among small cells in the dorsal part of the medulla, and distributing peripherally to the mucous membrane and circumvallate papillae of the back part of the tongue (second component); (2) general sensory fibres (first component); (3) finally, certain fibres arise from a motor nucleus—the nucleus ambiguus—lying on the ventral side of the sensory nucleus. These fibres innervate the stylopharyngeus muscle, and perhaps some of the constrictors of the pharynx (fifth component). Besides the lingual and motor branches above referred to, there are a tympanic branch to the middle ear, several pharyngeal branches, and anastomoses with the V, VII, X, and sympathetic nerves.

X. *Vagus or Pneumogastric Nerve.* The motor and sensory nuclei of the tenth nerve are scarcely distinguishable from the corresponding nuclei of the ninth. The size of the first (general cutaneous) component varies greatly in different animals. In fishes and amphibians there is also a large root entering the vagus from the tuberculum acusticum which supplies the organs of the lateral line of the trunk. In man the vagus communicates with the VII, IX, XI, XII, 1st and 2nd spinal, and the sympathetic. Its distribution is very wide, comprising branches to the dura mater, external ear, pharynx, larynx, heart, lungs, stomach, and other viscera. Throughout its entire extent the vagus is in frequent communication with the sympathetic, and it seems to share many of its functions with the latter. It controls, more or less directly, the more important automatic and vegetative functions of the body, such as circulation and digestion, and is thus of the most profound physiological significance.

XI. *Spinal Accessory Nerve.* The eleventh nerve consists of two parts: (1) The vagal portion is really detached filaments of the vagus, containing inhibitory fibres for the heart, motor fibres for the pharynx, &c. (2) The spinal portion arises from the lateral aspect of the spinal cord as far back as the fifth or sixth cervical vertebra in numerous separate strands. The fibres are motor, and arise from the lateral cornu of the cord. They turn cephalad, and are collected into a single trunk and emerge through the same foramen as the vagus. They supply the sterno-mastoid and trapezius muscles.

XII. The hypoglossal nerve arises from a large nucleus lying ventro-laterally of the central canal and chiefly below the fourth ventricle. The fibres are motor, and innervate the muscles of the tongue chiefly.

Literature: for further anatomical details consult the general works referred to under BRAIN, especially QUAIN'S Anatomy (10th ed.), iii. Pt. II, and Handatlas der sensiblen und motorischen Gebiete der Hirn- und Rückenmarksnerven, by C. HASSE, Wiesbaden (1895). For a general critical summary of all that has been written on the comparative anatomy of the cranial nerves, and especially on the relation between cranial and spinal nerves, see MAX FÜRBRINGER, Ueber die spino-occipitalen Nerven d. Selachier u. Holocephalen u. ihre vergl. Morphol. (1897). On the components the following will be found useful: OLIVER S. STRONG, J. of Morphol., x. 1 (1895); B. F. KINGSBURY, J. of Compar. Neurol., vii. 1 (1897); C. JUDSON HERRICK, J. of Compar. Neurol., ix, and Arch. of Neurol. and Psychopathol., ii (1899); W. H. GASKELL, J. of Physiol., vii, x; VON KUPFFER, Merkel und Bonnet's Ergeb., 562–618 (1896). On sensory fibres of the eye-muscle nerves see C. S. SHERRINGTON, Proc. Roy. Soc. London, lxi, No. 373, p. 247 (1897); G. C. HUBER, 'Atypical Motor Endings' of Retzius, Anat. Anz., xv (1899); and J. of Compar. Neurol., x. 2 (1900).

Spinal Nerves. There are in man thirty-one pairs of spinal nerves. Each pair, except the first, is named after the vertebra below which it emerges; thus we have eight cervical, twelve thoracic, five lumbar, five sacral, and a coccygeal nerve. Each spinal nerve arises by two roots from the SPINAL CORD (q. v.), of which the dorsal (sensory) is ganglionated. The ventral (motor) joins the ganglion, but merely to pass through it. Beyond the ganglion the mixed trunk divides into a small dorsal and a larger ventral

ramus, each containing both sensory and motor fibres. At each segment there is a communication with the sympathetic ganglion of this segment.

It was formerly held that the spinal nerves contain but two components — motor and sensory; but there is rapidly increasing evidence for separating the visceral nerves (efferent and afferent) from the somatic. We should therefore distinguish four kinds of fibres in each segmental nerve: (1) somatic afferent, sensory nerves from the skin; (2) somatic efferent, motor nerves for the voluntary, or skeletal muscles; (3) visceral afferent, nerves of 'general sensation,' &c.; (4) visceral efferent, supplying the involuntary muscles. The visceral systems are related to the lateral cornu and Clarke's column of the spinal cord. In the head these components are obscured, and, possibly, in part, supplanted by others; and it is not at present possible to establish sure homologies.

The table on the next page, from Edinger (based on Starr), exhibits the regional distribution from the various segments.

Literature: see the papers by GASKELL, cited under *Cranial Nerves* above, and QUAIN'S Anatomy (10th ed.), iii. Pt. II. 381–91 (with literature). For the courses of the several spinal nerves consult the textbooks of human anatomy already cited.

Sympathetic System. More properly, 'Sympathic System.' The sympathic or visceral, as distinguished from the cerebro-spinal nervous system, is primarily concerned with the vegetative functions. It consists of a double series of ganglia connected *inter se* and with the spinal ganglia, as well as with terminal ganglia adjacent to or imbedded in the visceral tissues.

The ganglia of the great sympathic chain (truncus sympathicus) are segmentally arranged, and each communicates with the corresponding spinal ganglion. The commissural fibres are of two kinds: (1) white (medullated), arising from the medulla oblongata by both dorsal and ventral roots, and terminating in the sympathic ganglia or passing through into the sympathic rami. They are both efferent and afferent. (2) Gray (non-medullated). They arise in the ganglion cells of the sympathic chain and join the spinal nerve just beyond the spinal ganglion. Some fibres turn peripherally into the spinal nerve; others terminate in the spinal ganglion around the bodies of the ganglion cells; others pass into the dorsal spinal roots and end in the sheath of that nerve, the dura mater, and the tissues adjacent, without entering the brain.

In the cervical and cephalic region the symmetry of this arrangement is disturbed, and the sympathic fibres are bound up with the cranial nerves in the most complicated manner. In the abdominal cavity large ganglionic plexuses lie adjacent to the viscera. Of these the most important are: (1) the cardiac plexus, lying against the aorta and pulmonary artery. It receives fibres from the tenth cranial nerve. (2) The solar, or epigastric plexus, in the upper part of the abdomen, behind the stomach, is the largest. It communicates freely with the whole visceral innervation, and with several smaller secondary plexuses.

The vaso-motor nerves arise in the central system, but lose their sheaths in the sympathic ganglia, and are thence distributed to the blood-vessels. See VASO-MOTOR NERVES.

Some sympathic functions are independent of central innervation; such are the automatic ganglia of the heart, and the plexuses of the intestine and uterus. Others are more or less indirectly or incompletely under central control. Among the important sympathic functions are, pupil reflexes, secretion, perspiration, digestion, and nutrition.

Conflicting views exist as to the origin of this system. Paterson claims that, so far from being derived from the central system, it is not even of ectodermal origin, but arises as an unsegmented mesoblastic cord. It is, however, more commonly regarded as an offshoot from the central system, and the evidence is in favour of the supposition that the sympathic ganglia arise from neuroblasts that wander from the rudiments of the spinal ganglia and those of sensory ganglia on the cranial nerves. These cells are at first apolar and proliferate by karyokinesis. His and others show that there is an actual migration of such neuroblasts. The ganglionic centres associated with the visceral organs are in turn the results of similar migrations from the chain of sympathic ganglia.

The fibres of the sympathic are usually non-medullated. The cells, unlike those of the spinal ganglia, are usually multipolar; very different, however, are the peculiar spirally wound cells shown in Figs. 14 and 15. Small cells in the stroma of glands and in the plexuses of the intestines, or in the walls of blood-vessels, supply free dendritic termini to the muscular and epithelial

REFLEXES: LOCALIZATION IN THE SPINAL CORD.

Segment.	*Muscles.*	*Reflexes.*	*Sensory Innervation of Skin.*
2 and 3. Cervical.	Sterno-mastoid. Trapezius. Scaleni, &c. Diaphragm.	Inspiratory reflex from pressure on ribs.	Neck and occiput.
4. Cervical.	Diaphragm. Supra- and infra-spinatus. Deltoid. Biceps and coraco-brachialis. Supinator longus. Rhomboidei.	Enlargement of pupil from neck irritation (from 4th to 7th cervical).	Neck, upper shoulder, lateral aspect of arm.
5. Cervical.	Deltoid. Biceps and coraco-brachialis. Supinator longus and brevis. Pectoralis (part). Serratus magnus. Rhomboidei. Brachialis anticus. Teres minor.	Scapular reflex (5 cervical to 1 thoracic). Tendon reflex of the corresponding muscles.	Dorsal aspect of shoulder and arm. Lateral aspect of upper arm and forearm.
6. Cervical.	Biceps. Brachialis anticus. Pectoralis (part). Serratus magnus. Triceps. Extensors of hand and fingers. Pronators.	Reflexes of the tendons of the extensors of the upper arm and forearm. Tendons of joints of hand (6–8 cervical).	Lateral aspect of forearm. Dorsal aspect of hand and radialis region.
7. Cervical.	Caput longum of triceps. Extensors of hand and fingers. Flexors of hand. Pronators of hand. Pectoralis (part). Subscapularis. Latissimus dorsi. Teres major.	Closing of fingers from blow on volar aspect of hand. Palmar reflex (7 cervical to 1 thoracic).	Radialis region of hand. Region of distribution of medianus nerve.
8. Cervical.	Flexors of hand and fingers. Intrinsic muscles of hand.	Pupil reflex.	Medianus and ulnar nerve regions.
1. Thoracic.	Extensor pollicis. Small muscles of hand, &c.	Pupil reflex.	Ulnar nerve region.
2–12. Thoracic.	Muscles of back and abdominal regions. Erectores spinae.	Epigastric (4–7 thoracic). Abdominal (7–11 thoracic).	Skin of the breast, back, and belly, and upper gluteal region.
1. Lumbar.	Ileo-psoas. Sartorius. Ventral muscles.	Cremaster reflex (1–3 lumbar).	Skin of pubic region, ventral aspect of scrotum.
2. Lumbar.	Ileo-psoas. Sartorius. Flexors of knee. Quadriceps femoris.	Patellar reflex (2–4 lumbar).	Lateral aspect of hip.
3. Lumbar.	Quadriceps femoris. Adductores femoris, &c.		Ventral and mesal aspect of hip.
4. Lumbar.	Abductores and Adductores femoris. Tibialis anticus. Flexors of knee.	Gluteal reflex (4–5 lumbar).	Inner aspect of hip and leg to ankle. Inner aspect of foot.
5. Lumbar.	Flexors of knee. Rotation of hip. Flexors of foot. Extensors of toes. Peronei.		Dorsal side of hip and thigh and lateral aspect of foot.
1 and 2. Sacral.	Flexors of foot and toes. Peronei. Small muscles of foot.	Plantar reflex.	Dorsal side of thigh, lateral aspect of leg and foot.
3–5. Sacral.	Muscles of perineum.	Achilles tendon. Bladder and rectal reflexes.	Skin of sacrum, anus, perineum, and genitals.

structures in a wealth of detail until recently unsuspected.

From the cervical sympathic arise pupil-dilating fibres; vaso-motor fibres for the side of the face, ear, part of eye, vessels of the oesophagus, larynx, thyroid body, and the brain and its meninges; also secretory and vaso-motor fibres to the salivary glands and perspiratory fibres. From the thoracic and abdominal sympathic arise the sympathic part of the cardiac plexus with its acceleratory fibres. The cervical and splanchnic portions contain fibres whose central stimulation

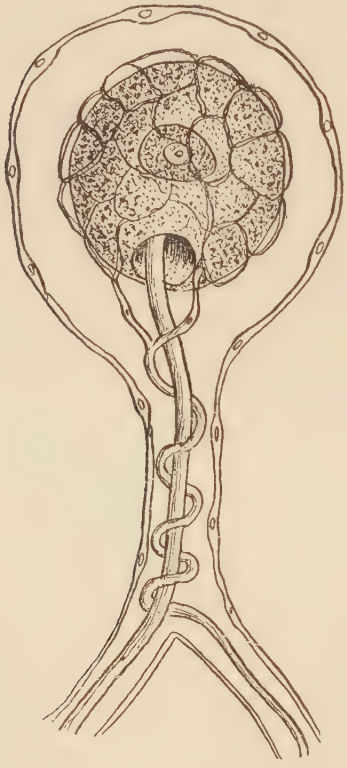


Fig. 14. Cell from sympathic ganglion of frog, with neurite originating within the cell, and dendrites of another cell spun closely around it. (From Kölliker after Arnold.)

excites the cardio-inhibitory system and the vaso-motor centre of the medulla oblongata. The splanchnic, coeliac, and mesenteric plexuses govern the vaso-motor functions of the viscera, as well as the specific functions of these organs.

The sympathic may rank as the least understood of the nervous mechanisms. The constant interaction with the central nervous system undoubtedly affords a basis for the somatic background of conscious life. It is well known that the vaso-motor changes are closely associated with emotional states, and that alterations in circulation precede, if they do not produce, emotions, such as fear. The close association of visceral disease with mental degeneration suggests other relations whose physiological rôle is as yet obscure.

Literature: consult the general works cited elsewhere in this article, and under BRAIN; W. H. GASKELL, J. of Physiol., vii (1886); H. HEAD, Disturbances of Sensation, Brain (1893–4); W. HIS, Arch. f. Anat. u. Physiol. (Suppl.-Bd., 1891); HUBER, J. of Compar. Neurol., vii. 2 (1897, with bibliography); and ibid., x. (1900) 135; A. v. KÖLLIKER, Naturw. Rundschau, x. 3–5; Int. med.-photogr. Monatssch., i–ii (1894–5); Wien. klin. Wochenschrift, vii. 40–1; Wien. med. Wochensch., xliv. 41; Münch. med. Wochenschrift, xli. 41–2; J. KYRIE, Die Segmentation des Sympathicus und seine Beziehungen zum cerebrospinalen Nervensystem (Vienna, 1894); J. N. LANGLEY, The Arrangement of the Sympathetic Nervous System, J. of Physiol., xv (1894); Preliminary Account of the same, Proc. Roy. Soc., lii. 320; On the Nerve-cell Connection of the Splanchnic Nerve Fibres, J. of Physiol., xx (1896); Physiological Congress (1895); J. of Physiol., xx (1896); LANGLEY and ANDERSON, The Innervation of the Pelvic and adjoining Viscera, Pts. II–V, J. of Physiol., xix. 139 (1895–6); On Reflex Action from Sympathetic Ganglia, J. of Physiol., xvi (1894); G. MAZZARELLI, Atti dell' XI. Congr. med. internaz. (Roma, 1894), ii. Anat., 67–8; also Atti della R. Acc. dei Lincei (1894), ii. Sem., No. 8, 269; A. M. PATERSON, Philos. Trans. Roy. Soc. London (1890), 159–86; A. MONSELISE, Morfologia del Gran Simpatico e sue funzioni nell' umano organismo (Milano, 1897). (H.H.)

Fig. 15. Similar cell from cervical ganglion of the dog treated by the Golgi method.

Nervousness [Lat. *nervosus*, sinewy, vigorous]: Ger. *Nervosität*; Fr. *nervosité, nervosisme*; Ital. *nervosismo* (or *neurosismo*).

A state of the nervous system characterized by an instability which may become variously manifest in conduct, emotion, and thought.

It is a frequent transitory experience in normal life, and is then often produced by a mixed group of predisposing causes, in which fear or apprehension is apt to be prominent. The apprehensiveness preceding an appearance before the public, the impatient awaiting of an announcement which may seriously affect one's welfare, the uneasiness or alarm provoked by a thunderstorm, the excitement of a patient before an impending operation may serve to suggest pertinent instances. The special sensitiveness to pain, and the anticipation of pain by imagination, are further nervous characteristics. Other symptoms of nervousness are motor restlessness, a tendency to start on slight alarm, palpitation, slight tremor, cold perspiration, tendency to be emotionally affected, excitability, irritability, and the like. Such moments or periods of nervousness may vary in intensity from slight deviations from normal equilibrium up to paroxysmal attacks of emotional disturbance, sometimes called 'nerve-storms.' The former may be considered as perfectly normal incidents under the influence of undue stress and strain, of critical periods of life, of ordinary fluctuations in physical and mental health. The latter are more or less pathological, and reflect an over-excitable condition of the nervous symptoms which, according to the accompanying systems and circumstances, may be recognized as neurasthenic, hysterical, epileptic, maniacal, &c.

Considered temperamentally, nervousness is a predisposition to states of instability of control; as such it plays a prominent part in the composition of human character as well as in the aetiology of mental disorders. Particularly in the problems of modern civilization, in the life that is lived under high pressure, with manifold demands on brain and sense-organs, on the emotions and the will, does the question of nervousness become of ever-increasing importance. The most direct pathological relation of nervousness is to NEURASTHENIA (q.v.); but it is also of fundamental importance in the aetiology of hysteria and other functional neuroses. The tendency to regard nervousness as equivalent to neurasthenia is not desirable, as the latter describes a typical disorder, while the former refers to a symptom or a temperamental characteristic which may accompany other disorders or may be quite normal.

Literature: see NEURASTHENIA; also KRAFFT-EBING, Nervosität u. neurasthenische Zustände (1895); A. DE GIOVANNI, La Neurosi (1900). (J.J.)

Nescience [Lat. *scientia*, knowledge, + the negative prefix *ne-*]: Ger. *Nichtwissen*; Fr. *nescience*; Ital. *nescienza*. Literally, the condition of ignorance; but in a recent quasi-technical philosophical use, the theory that certain forms of reality (as God, the soul, matter in itself, &c.) are beyond our knowledge.

While often used as equivalent to AGNOSTICISM (q.v.), it is also employed to describe the philosophy of Hamilton and Mansel, who would repudiate the title of Agnostics, but who hold that only an indirect or mediate knowledge of the existence of the Absolute, akin to faith or belief rather than to thought, is possible. (J.D.)

Nestorians: Ger. *Nestorianer*; Fr. *Nestoriens*; Ital. *Nestoriani*. A sect of early Christians, founded by Nestorius, who maintained the individual distinctness of the divine and human elements in the nature of Jesus Christ, and consequently his bi-personality under the appearance of a unitary consciousness.

The doctrine of Nestorius roused a controversy which engaged the attention of a number of councils, and was finally settled by the banishment of Nestorius from Antioch, the Nestorian stronghold, about A.D. 433. The sect was transferred to Edessa, where it continued to flourish, spreading into Egypt, Arabia, India, and China. After the rise of Mohammedanism and during the Arabian domination in the East they increased their influence and stimulated an important intellectual development among the Arabs, the centre of which was at Bagdad. For several centuries they have been steadily declining, but still constitute several important communities of Eastern Christians.

Literature: SMITH and DWIGHT, Researches (1833); GRANT, Nestorians (1841); DOUCIN, Hist. du Nestorianisme; ANDERSON, Hist. of Missions in the Oriental Churches; WALCH, Gesch. d. Ketzereien; BAUER, Gesch. d. Dreieinigkeit; UEBERWEG, Hist. of Philos., i, 'The Nestorians.' (A.T.O.)

Net [Lat. *nitidus*, clear, pure, through Fr.]: Ger. *Netto*; Fr. *net*; Ital. *netto*. Whatever part of a quantity remains after deducting the negative quantities which offset it. For instance, net income is an excess of income

above expenses. 'If a person is engaged in business, his net income is found by deducting from his gross income the outgoings that belong to its production' (Marshall).

The conception of net income or earnings seems a simple one, but is really very perplexing. What are the expenses involved in the production of a certain article? Do they include the personal expenditures of the producer which fit him for doing his work more thoroughly? Marshall, in his conception of public net income or *national dividend*, does not include these things as business expenses; but it is hard to give a reason for excluding them. On the other hand, if we once begin to include any such expenses in our deduction, it is almost impossible to tell where to draw the line. The best work in this subject has been done by Cannan. (A.T.H.)

Neuralgia [Gr. *νεῦρον*, nerve, + *ἄλγος*, pain]: Ger. *Neuralgie*; Fr. *névralgie*; Ital. *neuralgia*. A nervous disorder characterized by paroxysmal pain, which is usually along the distribution of one nerve, and unilateral, and which is not due to changes in the periphery of the nerve or to organic disease, but to nutritive or functional changes in the conditions of the nerves or to NEURITIS (q. v.).

Neuralgia is especially prone to occur in families of neurotic temperament. It is rare in early youth, largely confined to middle life, more frequent in women than in men, and is often induced by cold, exhaustion, overwork, worry, mental shock, lack of rest, and the strains accompanying periodic physical functions. The first attack quite generally comes on when the subject is in a condition of general or special debility. The attacks may appear suddenly and spontaneously, or may be preceded by a brief feeling of numbness or anaesthesia, by twitching, or by an indisposition which ushers in the nerve-pain at first in brief darts of minor intensity and then in more continuous but still periodic spasms of severe burning, boring, or shooting pains, until these in turn become less and less frequent, and leave the sufferer in an exhausted condition. Neuralgias are of an indefinite number of varieties, according to the nerves affected, the distinction between superficial and visceral neuralgias being a prominent one. Painful points which are sensitive to pressure are often present.

Literature: all the treatises on nervous diseases (e. g. GOWERS) contain adequate descriptions of neuralgia. For a special treatise see CHAPMAN, Neuralgia (1873); and especially BERNHARDT, in Nothnagel's Spezielle Pathol. u. Therapie, xi. Pt. II. 185–440; HALLION, in Traité de Méd. de Charcot, vi. (1895); BOULAY, in Manuel de Méd. de MM. Debove et Achardon; GROCCO, in Trat. ital. di Patol. e Terapia med. (1898). (J.J.)

Neurasthenia [Gr. *νεῦρον*, nerve, + *σθένος*, strength]: Ger. *Neurasthenie*; Fr. *neurasthénie*; Ital. *neurastenia*. In general, nervous debility or weakness (cf. NERVOUSNESS); but usually employed in a more special sense to indicate a pronounced degree and form of such weakness, with typical symptoms of a morbid character.

Historical. While the condition was in a measure known and partially described by older writers (Robert Whyte, 1765, Marshall, Darwin, Villemain, Jaeger, and others), its modern prominence dates from the writings of Bouchut (1860) and Beard (1868). The latter brought the term neurasthenia into general use, although it was employed in 1867 by Van Dusen, and occurs in Dunglison's *Medical Dictionary* of 1833 (Dercum). Of other names for the malady may be mentioned encephalasthenia (Althaus), the French nervosisme, cachexie, and the more popular terms, nervous prostration, nervous exhaustion, failure of brain power, pathological fatigue, morbid irritability.

Varieties. Neurasthenia is a symptom-complex occurring, like hysteria, under the most varying circumstances, but so frequently alone that in a great majority of cases it may be recognized as a true idiopathic condition. In the ordinary typical cases the symptoms partake of a mental as well as a sensori-motor character, and this type has been termed cerebro-spinal. When the mental symptoms are particularly marked and the motor symptoms not prominent, the condition is by some termed cerebral neurasthenia (cerebrasthenia, encephalasthenia); while spinal neurasthenia (myelasthenia) is characterized by motor abnormalities, particularly by difficulty in walking, by a feeling of sinking of the limbs, by abnormal locomotor tendencies, &c. A specific sexual neurasthenia has been described by Beard, Krafft-Ebing, and others; gastric or dyspeptic neurasthenia (nervous dyspepsia) has received special attention (Glatz). Hystero-neurasthenia is an approximation of neurasthenical symptoms to a hysterical type—a condition emphasized by French writers. Hereditary, traumatic, adolescent, neuralgic, and other forms of neur-

asthenia are mentioned in literature. In some cases it is difficult to distinguish neurasthenia from a mere pronounced temperamental peculiarity, or from rudimentary paranoia, or the prodromal symptom-complexes of other nervous and mental diseases (dementia praecox, general paralysis, paranoia). It seems best to regard the general difficulty as of one main type, with tendencies for certain groups of symptoms (motor, sensory, hypochondriacal, depressive, fatigue, &c.) to become specially emphasized. Of other maladies associated with neurasthenia, neuralgia and migraine are the most frequent.

Nature and Course. Neurasthenia is a functional disorder of the central nervous system. The nature of the disturbance which conditions the neurasthenic state is not known. Neurasthenia is, with few doubtful exceptions, of a chronic character; its onset is slow; the symptoms ensue in irregular sequence; they appear first in lighter and then in more cumulative form, and the entire attack often covers a period of many years. A marked characteristic is the fluctuation and recurrence of the symptoms both in shorter and longer periods, while moments of intense paroxysmal attacks are not uncommon. As the disease is often of long standing before treatment and recovery begin, so there is also a considerable period of convalescence, during which many of the typical neurasthenic symptoms persist. Not unfrequently some traces, like scars, remain almost indefinitely. The disorder is rarely fatal, nor is it prejudicial to longevity.

Aetiology. It cannot as yet be determined to what extent heredity, early development, and later influences tend to form peculiar 'neurasthenic' constitutions, the aggravation of which is known as constitutional chronic neurasthenia, with its exacerbations and special types; and also to what extent transitory debilitating conditions can produce the chronic exhaustion which is commonly termed nervous prostration or acquired neurasthenia. Speaking in general terms, we may recognize the hereditary predisposition as the most prominent aetiologically. Ziehen finds that a neurotic inheritance is traceable in 74 per cent. of all cases; that men are more liable to the disorder than women; that the years from twenty to thirty yield relatively the largest proportion of cases, and that 70 or 80 per cent. of cases occur between the ages of twenty and fifty years. Race and nationality, social status and mode of life, are of influence, but no exact relation has been determined. The effects of unhygienic conditions of life, of abnormalities of sexual life, of accidents, over-exertion, fright, and of ill health generally, and most frequently the accumulated strain of overwork under conditions of worry and stress, may be traced as causal factors. Professional brain-workers and those engaged in responsible and worrying positions are particularly disposed to the disorder. Neurasthenia has been characterized as the typical malady of modern civilization.

Symptoms. The symptoms of neurasthenia may be considered under the head of (1) mental attitude; (2) the subjective sensory and motor disturbances; (3) the physical condition. The great variability of the symptoms and their tendency to involve more than one of these factors must not be lost sight of. (1) Prominent mental symptoms are the difficulty in holding the attention for a protracted effort, a speedy fatigue, a diminished readiness for acquisition of new impressions, momentary states of confusion and distraction, mental restlessness and unsettlement, the persistence of unbidden thoughts, irregularity of memory, a lack of pleasure in ordinary occupation, irritability, excessive anxiety about small affairs, lack of self-control, an undue occupation with one's own bodily and mental condition, unreasonable fears and aversions, marked idiosyncrasies, and the like. Along with these there are often periods of intense depression (particularly in severe cases or where the disorder reaches its worst stages), occasionally leading to suicide.

This great variety of mental symptoms is more or less easily traced to states of fatigue and the irritability characteristic of certain phases of fatigue. The neurasthenic fears are characteristic, and often constitute the most distressing symptoms. Their unreasonableness is recognized by the patient; conduct is often carried out in opposition to them, but they always occasion anxiety, distress, and a feeling of impending calamity. Almost all the various PHOBIAS (q.v.)—agoraphobia, claustrophobia, mysophobia, and so on—have been noted in neurasthenia. Such hesitation in conduct may be properly viewed as a defect of will or irresolution. This is exhibited in the difficulty of maintaining the attention, the restlessness, the slow and weak attempts to throw off invalid habits, the dependence upon others, and the necessity

of constant stimulation and encouragement. (2) Of first importance among the sensory symptoms are the paraesthesias, or abnormal sensations, and the characteristic pains. Such paraesthesias are difficult to describe. The patient complains of a feeling of tightness in the head, a feeling of heaviness, a feeling of inward pressure (this symptom, 'Kopfdruck,' Ziehen finds in 85 per cent. of all cases), a sense of confusion in orientation, and various forms of VERTIGO (q.v.). He is subject to various dull, aching pains, or fatigue pains as the result of slight exertions, while specific throbbing or piercing local pains in the head or spine are not uncommon. The tendency of such symptoms to fluctuate and to disappear under proper mental stimulation indicates their quasi-subjective (psychogenic) character. Disturbances of the specific sense-impressions are less common. Blurring of the images, as in protracted reading; difficulty in accommodation; buzzing, pulsating, or beating in the ears; tickling or itching in the skin, and local hyperaesthesias are frequently noted. Of motor disorders may be mentioned a muscular weakness often markedly felt, and which, probably in combination with a vaso-motor disorder, at times gives rise to a feeling of faintness and impending unconsciousness. Tests with the dynamometer indicate an abnormally early appearance of fatigue symptoms. Delicate co-ordinations are often affected; the handwriting loses in definition; slips of the tongue in speaking, twitching of the muscles, tremor, hoarseness, or a hollow sound of the voice, and motor restlessness are also common. Disorders in the reflexes are frequently noted. The knee-jerk is apt to be exaggerated, or to present irregularity of action. In spinal neurasthenia motor disorders of locomotion are marked. (3) Bodily symptoms are not uncommon accompaniments of neurasthenic conditions, however insufficient in themselves for a diagnosis of neurasthenia. Anaemia is often present; the heart action may be irregular; digestive disturbances are quite common; the palms of the hand may perspire under unusual conditions; there may be a special sensitiveness to heat and cold and to changes of the weather; the respiration is often accompanied with effort, a sort of neurasthenic asthma; an explosive irritating cough may appear; a peculiar flushing of the skin when touched or stroked may be observed, while irregularities in the urine (oxaluria, phosphaturia, and excess of uric acids and urates) are particularly significant. Sexual abnormalities, both as symptoms and as aetiological factors, are often present, and when prominent form the sexual type of neurasthenia. Irregularities of sleep, mostly insomnia, are the rule; even where the amount of sleep is sufficient it is apt to be interrupted and unrefreshing in character.

Interpretation. The keynote of neurasthenia is an inability to recuperate, due to a subjective disturbance of balance between efficiency and output of energy; hence the characteristic feeling of exhaustion, with the peculiar sensations of pains and fears, and the cumulative effect of irritability accompanying weakness and fatigue. Physically it becomes manifest, apart from excessive exhaustibility, in the prostration of the nutritional functions, and quite usually in profound vaso-motor disorders. Neurasthenia thus illustrates the effects of a pathological fatigue, and illustrates as well the varied and widespread manifestations of such a fatigued condition. Neurasthenia further is peculiarly subjective (psychogenic) in many of its symptoms; such symptoms are not without objective basis, nor are they in any true sense feigned or assumed; but they are so markedly aggravated and made chronic by self-consciousness and worry and so generally subject to emotional influences as to suggest a quasi-subjective origin. Neurasthenia further illustrates the importance of the emotional factors in mental processes. It is mental worry rather than overwork that induces the fatigue of neurasthenia; it is the environment, free from anxiety, that is so much more difficult to procure than mere rest from exertion. The emotional factor conditions the fatigue potentiality of overwork; the emotional attitude often makes the distinction between work and recreation, and it is because this emotional attitude is so largely a matter of temperament that neurasthenia exists as a diathesis, even where it does not become developed as a specific disorder. In the disease itself the prominence of the emotions is exhibited most of all in the morbid fears and in the depression and irritability that in some cases constitute the most important symptoms.

The relation of neurasthenia to the conditions of modern existence, particularly in large cities, is doubtless an important one. The disease is not a new one, however, though brought into prominence by recent study. In the overwork of the schoolroom, in the stress and strain of youthful ambition, in the worry

and competition of commercial enterprise, the cares of public life, the inconsiderate absorption of the scholar, the excessive demands of society, the hunger for wealth and station, the incessant wear and tear of a modern metropolis, and in other unwholesome influences, certainly lie the influences by which neurasthenia is propagated. The contrast between these conditions and those of a half-century or more ago may well explain the increased frequency of the disorder.

Literature: among earlier contributions: Bouchut, Du Nervosisme aigu et chronique (1859, 2nd ed. 1877); Beard, Nerv. Exhaustion (1880); Amer. Nervousness (1881); and Sexual Neurasth. (1884); Corning, Brain Exhaustion (1884). More recent: Krafft-Ebing, Die Nervosität u. d. neurasth. Zustände (1895); F. C. Müller, Handb. d. Neurasth., in Moebius, Neue Beitr., ii. 62–122; Loewenfeld, Pathol. u. Ther. d. Neurasth. u. Hysterie (1894, with bibliog.); Binswanger, Die Pathol. u. Ther. d. Neurasth. (1896); Gilles de la Tourettes, Les états neurasth. (1898); Bouveret, La Neurasth. (2nd ed., 1891); Levillain, La Neurasth. (1891); Glatz, Dyspepsie nerv. et Neurasth. (1898); Kraepelin, Psychiatrie (1898), ii. 45–56, 520–62; Moll, Das nervöse Weib (1898); Schrenk-Notzing, Neurasth. (1894); Althaus, Failure of Brain Power (1898); Cullerre, Nervosisme et Neuroses (1887); Borel, Nervosisme et Neurasth. (1894); Dornblüth, Nervöse Anlage u. Neurasth. (1896). See also Nervousness. (J.J.)

Neuraxis [Gr. *νεῦρον*, nerve, + *ἄξων*, axis]: Ger. *Centralnervensystem*; Fr. *névraxe, axe cérébrospinal*; Ital. *neurasse*. The cerebrospinal axis, or central nervous system, including the brain and spinal cord. Other terms used are myelencephalon, neuron, axion. (H.H.)

Neurility [Gr. *νεῦρον*, nerve]. Sometimes used for nervous conduction. See Nerve Stimulation and Conduction.

Neurite [Gr. *νευρίτης*]: Ger. *Neurit* (Rauber), *Neuraxon* (Kölliker); Fr. *cylindre-axe*; Ital. *cilindrasse*. The main or cellifugal process of a nerve-cell. Cf. Dendrite, and Neurocyte.

The neurite, or 'axis-cylinder' process, is commonly more simple than the dendrite, though not devoid of collaterals, and ending sooner or later in free arborizations or an End-organ (q. v.). (H.H.)

Neuritis [Gr. *νευρίτης*]: Ger. *Nervenentzündung*; Fr. *névrite*; Ital. *neurite*. An inflammatory condition of a peripheral nerve.

Severe functional disturbance, such as neuralgia, may occur without inflammation, but where acute or purulent neuritis occurs it may advance until Degeneration (q. v.) supervenes. The axis cylinder resists the longest, and may be regenerated after extensive destructive processes have taken place. Where the inflammatory changes are slight and chronic, the state is spoken of as chronic degenerative atrophy. Where various parts of the body are simultaneously affected the disease becomes a multiple neuritis. Alcoholic multiple neuritis is a common form of the latter, and this type may include sensory or motor fibres, or both. (H.H.)

Neuroblast [Gr. *νεῦρον*, nerve, + *βλαστός*, layer]: Ger. *Neuroblast*; Fr. *neuroblaste*; Ital. *neuroblasto*. An embryonic nerve-cell of the central nervous system; an immature Neurocyte (q. v.). Cf. Nervous System (Histology). (H.H.)

Neurocyte [Gr. *νεῦρον*, nerve, + *κύτος*, cell]: Ger. *Neuron*; Fr. *neurone*; Ital. *neurone*. The adult nerve-cell of whatever kind within the central system, together with all its appendages. A recent usage, however, applies the term to the cell-body to the exclusion of the appendages. The former is preferred. Cf. Neuroblast, and Neurone.

The appendages are usually of two orders, Dendrites (q. v.) and the Neurite (q. v.). The latter may be secondarily provided with sheaths and other accessories. The stimulus normally enters through the dendrites and discharges through the neurite. Both neurite and dendrites break up at their termini into Arborizations (q. v.). A variety of terms have been proposed for the unit of nervous structure. 'Ganglion cell' is inapt, for a ganglion, in strictness, is an extra-axial cell cluster. 'Neuron' (Waldeyer) is largely used, but aside from the matter of etymology, it has been used (Wilder) in the sense of the entire axial nervous system, as well as (Schäfer) for the Neurite (q. v.) and a portion of the spinal cord (Kölliker). 'Neurodendron' has been recently substituted, but its etymology is ambiguous, and moreover not all neurocytes have dendrites. Analogy and recent usage favour the employment of the termination *-cyte* for mature cells and *-blast* for embryonic cells. See Fish, 'Terminology of the Nerve-cell,' *J. of Compar. Neurol.*, iv (Sept., 1894). (H.H.)

The term Neurone (q. v.) is, however, coming into very general use with this mean-

ing, and may be made general without confusion with the shorter form neuron. See Barker, *The Nervous System*, 39 ff., for discussion and literary references. (J.M.B.)

Neuroglia [Gr. *νεῦρον*, nerve, + *γλία*, glue]: (same in the other languages). The non-nervous supporting framework of the central nervous system.

Two classes of cellular elements are usually included under the term: (1) true connective tissue, of mesodermal origin, brought into the central nervous system in small amounts chiefly with the blood-vessels, and (2) cells and fibres derived from the original ectodermal cells of the embryonic nerve-tube (see Brain, Embryology). The latter, or true neuroglia, is composed partly of these original epithelium cells, greatly modified, and partly of derivatives from them, which wander out into the brain substance and there give rise to fibres, which form a dense mesh-work, within which the nervous elements are enclosed. Weigert claims that in the adult human brain the neuroglia fibres are entirely distinct from the neuroglia cells. According to Bevan Lewis the neuroglia cells may function as 'scavenger cells,' assisting in the elimination of effete material. If nerve tissue is destroyed by disease, its place is usually taken by neuroglia.

Literature: W. L. Andriezen, Brit. Med. J. (July 29, 1893); F. W. Eurich, Studies on the Neuroglia, Brain, xx (1897); W. His, Arch. f. Anat. u. Physiol., Suppl.-Bd. (1890); A. Kölliker, Handb. d. Gewebelehre des Menschen (6th ed.), ii. 136 (Leipzig, 1896); M. v. Lenhossék, Der feinere Bau des Nervensystems (Berlin, 1895); Bevan Lewis, A Textbook of Mental Diseases (2nd ed., Philadelphia, 1900); F. B. Mallory, Centralbl. f. allg. Pathol. u. pathol. Anat., vi (1895); W. F. Robertson, J. of Ment. Sci., xliii (1897); Retzius, Biol. Untersuch. (1893); J. Schaffer, Arch. f. mikr. Anat., xliv (1894); E. W. Taylor, A Contribution to the Study of Human Neuroglia, J. of Exper. Med., ii (1897); Vignal, Développement d. Éléments du Syst. nerv. (Paris, 1889); Carl Weigert, Abhandl. d. Senckenberg'schen Naturf.-Ges., xix (1895). (H.H.)

Neurology [Gr. *νεῦρον*, nerve, + *λόγος*, discourse]: Ger. *Neurologie, Nervenlehre*; Fr. *neurologie*; Ital. *neurologia*. The science of nervous structures and functions. The scope of neurology is limited by its subject-matter rather than its method, and may be correlated with the departments of myology and osteology, deriving its chief claim to recognition as an independent science from its direct bearing upon psychology and phylogeny.

Comparative Neurology is not merely that department of neurology which includes the study of the nervous system of inferior animals; the term especially designates that method of approaching the problems of nervous function which employs the combined biological procedures, such as embryology, histology, pathology, physiology, and life history, and applies the results from the lower groups in the interpretation of human neuroses. It is in this sense that the term is employed, e. g. in the *Journal of Comparative Neurology*. See further C. L. Herrick, 'The Problems of Comparative Neurology,' and 'Neurology and Psychology,' *J. of Compar. Neurol.*, i (1891), and Morselli, *Semej. malat. ment.*, ii (1895).

The *Technology of Neurology* is essentially that of modern biology at large. Nearly all the marvellous progress of the last decades can be traced directly to the effect of improved histological and experimental technique. The processes which are most essential are such as permit (1) the fixation, hardening, and preservation of tissues; (2) the sectioning, teasing, or isolation of the substance; (3) the staining, impregnation, and differentiation of the several elements. In the hardening processes (including fixation, &c.) the reagents most useful are chiefly such as contain, or are composed of, alcohol, chromic salts, corrosive sublimate, acetic acid, osmic acid, platinic chloride, formalin, &c. For purposes of sectioning, simple freezing or impregnation with a coagulable or solidifying mixture, such as paraffin, celloidin, gum, soap, &c., precedes the actual slicing with the microtome, after which the adhesive substance is dissolved and the section is prepared for preservation. Staining is sometimes accomplished prior to sectioning, but is often only possible after the delicate section has been glued by means of albumen, collodion, or the like to the glass slip to which it is permanently attached.

The staining reagents are innumerable, but among the most important are compounds of haematoxylin, and various aniline dyes which have selective affinities for various cells or parts of cells, and which react in a way determined by the relation between their own chemical condition and that of these organs. Staining *intra vitam* by means of methylene blue has become a technique by itself, and has

yielded marvellously intricate and delicate pictures of the finest ramifications of nervous fibrils. This method has been especially fruitful in the study of the ultimate termini of the peripheral nerves.

Nissl has introduced a method of applying methylene blue to the cells of the central nervous system, which has been productive of great advancement of our knowledge of the alterations in internal structure which these cells undergo in different functional and pathological states.

The methods of Golgi, and other applications of the idea of precipitating silver or mercury salts within the cellular elements, have effected a revolution in our knowledge of the relations of cell with cell, and demonstrate the unsuspected extent of interrelation and association between centres.

Golgi's method was first published by its inventor as early as 1873, but was not brought into prominence until a decade later, when Golgi's great monograph on the finer anatomy of the nervous system appeared. And indeed this splendid work was ignored by the majority of European anatomists until Forel. His and others worked over the ground and correlated it with the current data of embryology and experimental neurology. Then the import of Golgi's discoveries was first made manifest, and all neurologists eagerly took up the method. Never before had it been possible to see a complete nerve-cell, for none of the older methods bring out the ultimate ramifications of the nervous processes. It now became possible to demonstrate that the nervous system is composed of cells, comparable in embryonic origin and adult structure to those of the other tissues of the body, and the implications of this discovery in physiology and pathology have been very far-reaching. From it has grown the doctrine of the neurone as the structural and functional unit of the nervous system. The validity of the neurone theory and its enormous importance as a tool of research are in no wise dependent (as some seem to suppose) on the idea of the strict anatomical independence of the neurones in the adult body. That they are independent in embryonic origin is well established, but secondary fusions of various kinds may occur during development.

The haematoxylin-copper processes of Wiegert and Pal are still indispensable to a study of fibre-tracts. These methods rest upon the principle that the myelinic sheaths of the medullated nerves, after mordanting in a solution of chrome or copper and staining with haematoxylin, resist the action of a decolorizer longer than do the other tissues. All medullated fibres appear brilliant blue on a clear ground.

Also of great importance are the experimental degeneration methods. The first of these is Marchi's method. If the continuity of a tract is interrupted during life, either by disease or experimentally, degeneration of its fibres ensues (see DEGENERATION). Now, if the specimen is treated first with a solution of chromic salts and then with osmic acid, the degenerated fibres only are blackened by the osmium, and thus the injured tract can be differentiated and clearly followed. Marchi's method brings out the degenerated fibres only. If, now, the centres to which the injured nerve is related are examined by Nissl's method, the cells from which the degenerate fibres spring will show a characteristic 'Nissl degeneration' of their protoplasmic contents, and can thus readily be distinguished from other cells among which they may be mingled.

This principle is employed in the study of the degenerations produced by von Gudden's method, a method of determining the structure and functions of the brain by the removal of parts of the nervous system or sensory organs from a newborn animal, and the investigation of the consequent atrophic changes or secondary degenerations in later life. Upon this method, more than any other, we are dependent for exact knowledge of the ultimate courses of individual tracts in the intricate mazes of the higher centres.

Antiseptic methods permit an amount of operative interference impossible a few years since, and the progress of electrical mensuration is utilized in a study of conductivity and resistance. A statistical method applied to pathology and controlled by necropsy returns, and histological analysis, is daily contributing to our knowledge. The study of the results of FATIGUE in lower animals interprets the conditions encountered in diseased states of man.

Literature: for the detailed application of these methods, consult the technological manuals, especially LEE, The Microtomist's Vade-Mecum (4th ed., Philadelphia, 1896), and the works there referred to; also BEVAN LEWIS, The Human Brain, Histological and Coarse Methods of Research (1882); POLLOCK, Die Färbetechnik des Nerven-

systems (1897), also Eng. trans.; Van Gehuchten, Anat. du Syst. nerveux de l'Homme (3rd ed., 1901); Dejerine, Anat. du Syst. nerveux, i (1896), ii (1901).

On the methylene blue method, see especially P. Ehrlich, Ueber die Methylenblaureaction der lebenden Nervensubstanz, Deutsche med. Wochensch., xii (1886); H. Riese gives a general review of the method to date in the Centralbl. f. allg. Pathol. u. pathol. Anat., ii (1891); A. Bethe, Studien über das Centralnervensystem, Arch. f. mikr. Anat., xliv (1895). For the list of the contributions to the cytology of the nerve-cell by F. Nissl and others who have used his method, see chap. x of Barker's The Nerv. Syst. and its Constituent Neurones (New York, 1899); also the extensive bibliography by Smith Ely Jelliffe in the Arch. of Neurol. and Psychopathol., i (1898). On the Golgi method consult Golgi, collected works, translated into German as Untersuchungen über den feineren Bau des centralen u. peripherischen Nervensystems (Jena, 1894); an English translation of a part of this work is given by Strong, under the title Review of the Golgi Method, in the J. of Compar. Neurol., vi (1896); A. Hill, The Chrome-silver Method, Brain, xix (1896); C. Weigert has given a comprehensive review in Merkel u. Bonnet's Ergebnisse d. Anat. u. Entwicklungsgeschichte, v (1896).

Neuronymy: the nomenclature of the nervous system. It is in a transition state, and the various methodical attempts to secure a uniformity and consistency of usage are, as yet, serving chiefly to call attention to the confusion still existing.

The ambiguity and confusion incident to independent naming of organs, and the use of discordant directional terms, has long been recognized, and individual attempts to remove the inconsistencies have been numerous. Owen, Henle, Parker, Schultze, and Wilder have contributed notably towards a systematic reform, though the immediate result of agitation in each case is to add to the existing confusion.

Most harmful is the ambiguity growing out of uncertainty as to the standard of reference in terms of direction and position, especially when the same relative positions are referred to both lower animals and man. Through the combined influence of F. E. Schultze and B. G. Wilder, we are now rapidly approaching substantial uniformity on the part of careful writers. Thus 'dorsal' and 'ventral' have very generally superseded 'anterior' and 'posterior,' and instead of 'in an anterior direction' or 'towards the front,' the majority of English writers employ the directive adverb 'ventrad,' though the too frequent use of the suffix '-ad' is offensive to many. 'Forward' or 'upward' as applied to a direction towards the cephalic extremity is replaced by 'cephalad,' 'frontal,' 'rostral,' 'capital,' 'acrad,' 'cranial,' and others, while nearly all writers employ 'caudal' or 'caudad' for the opposite direction. The terms 'proximal' and 'distal,' 'ental' and 'ectal,' 'peripheral' and 'central,' and their adverbs in '-ad,' are very generally used. 'Mesal' and 'lateral' seem to have been less generally acceptable. In Germany the mesal plane is termed sagittal.

In 1895 the results of the deliberations of the German Nomenclature Commission were published by William His. A commission of English anatomists failed to report in time to be incorporated, while the recommendations of the American committees were for the most part ignored. All these recent undertakings have in common a desire to restrict a single name to a single organ, and to employ directive and descriptive terms consistently for all subjects. The preference of the American committees for single-word terms (mononyms) where practicable, although recognized by a majority as desirable, has not thus far been widely adopted because of prejudice against barbaric combinations and in favour of adhering to historical priority. It is impossible in this place to go into details, and the reader is referred to the works cited below. The article by Wilder is the fullest recent discussion, accompanied by extensive comparative tables and a bibliography.

The immediate result of the discussion now in progress may be to prevent much laxity of usage due to carelessness, but unanimity may be long delayed.

Literature: P. A. Fish, The Terminology of the Nerve Cell, J. of Compar. Neurol., iv (1894); W. His, Vorschläge zur Eintheilung des Gehirns, Arch. f. Anat. u. Physiol., Anat. Abth. (1893); Die anatomische Nomenclatur, Nomina anatomica: Verzeichniss der von der Anatomischen Gesellschaft auf ihrer ix. Versammlung in Basel angenommen Namen. Eingeleitet und im Einverständniss mit dem Redactionsausschuss erläutert; ibid., Suppl.-Bd. (1895); W. Krause, On Anatomical Nomenclature, Brit. Assoc. Rep. (1891); also

Int. Monatssch. f. Anat. u. Physiol., ix (1892); T. Jeffrey Parker, On the Nomenclature of the Brain and its Cavities, Nature, xxxv (1886); P. H. Pye-Smith, Suggestions on some Points of Anatomical Nomenclature, J. of Anat. and Physiol., xii (1877); B. G. Wilder, Neural Terms, International and National, J. of Compar. Neurol., vi. (Dec., 1896) 216–352; Proc. Assoc. of Amer. Anatomists, Tenth Session (1897), 27–60; C. L. and C. Judson Herrick, Inquiries regarding Current Tendencies in Neurological Nomenclature, J. of Compar. Neurol., vii (March, 1898), embodying the results of an attempt to secure a consensus of views by means of a circular sent to neurologists in the interests of this work. (H.H.)

Neuromeres [Gr. *νεῦρον*, nerve, + *μέρος*, part]: Ger. *Nervensegmenten*; Fr. *renflements métamériques de la moelle*; Ital. *neuromeri, neurotomi*. Node-like and transitory dilatations of the medullary tube resembling the primitive segmentation (metameric) of the embryonic body.

Widely divergent views are held as to the significance of these structures, which can no longer be held to be artifacts. Recent observations tend to render doubtful the theories that this segmentation is wholly due to mesodermic influence or entirely a result of the proliferations at the root of the nerves. They have a constancy, moreover, indicating that they can hardly be accidents of growth.

Literature: B. H. Waters, Primitive Segmentation of the Brain, Quart. J. Microsc. Sci., N.S., xxxiii (1892); W. A. Locy, Contribution to the Structure and Development of the Vertebrate Head, J. of Morphol., xi (1895); Neal, The Segmentation of the Nervous System in Squalus acanthias, Bull. Mus. Compar. Zool., xxxi. 7 (1898). The two last contain full bibliographies, in which consult especially the works of Hoffmann, Kupffer, Béraneck, van Wijhe, and Froriep. (H.H.)

Neuron [Gr. *νεῦρον*, a nerve]: Ger. *Neuron*; Fr. and Ital. *neurone*. Originally employed in English for the central nervous system, or Neuraxis (q. v.), but has of late come into general use as a name for the nerve unit (after Waldeyer). See Neurone, and Neurocyte. (H.H.)

Neurone: for foreign equivalents see Neuron. The unit of nervous structure, Neurocyte (q. v.), or nerve-cell, a term free from the ambiguity attending the German form Neuron, and hence preferred by many of the most recent writers, especially in America. See L. F. Barker, *The Nervous System* (1899), chap. v. (H.H.)

Neuronymy: see Neurology.

Neuropathy [Gr. *νεῦρον*, nerve, + *παθεία*, suffering]: Ger. *Nervenleiden, Neuropathie*; Fr. *névropathie, affection* (or *maladie*) *nerveuse*; Ital. *neuropatia*. An abnormal or diseased condition of the nervous system or some part of it. See Neurosis. (H.H.)

Neuropilem [Gr. *νεῦρον*, nerve, + *πῖλος*, hair]: Ger. *Neuropilem, Nervenfilz*; Fr. (not in use—Y.D.); Ital. *neuropilema*. A meshwork of nervous arborizations forming a system of intercommunication between various neurocytes; contrasted with neuroreticulum or histological plexus.

Modern research has made it increasingly evident that actual anatomical continuity between the terminal arborizations of centrifugal and centripetal systems is not necessary to nervous interchange. The methylene-blue method of Dogiel has, however, demonstrated association by continuity in the retina and skin, and it probably exists to a greater or less extent in the central system. Cf. Nervous System (Histology). (H.H.)

Neuroplexus: for foreign equivalents for Plexus, see that term. An interlacing meshwork of peripheral nerve-fibres (to be distinguished from a vascular plexus, or meshwork of capillaries). Cf. Plexus, and Ganglioplexus. (H.H.)

Neuropore [Lat. *neuroporus*]: Ger. *Neuroporus*; Fr. *névropore*; Ital. *neuroporo*. The opening by which the cavity of the medullary tube communicates with the surface at its cephalic extremity; the morphological front of the brain (Kupffer).

The opening has been observed in several groups of fishes, and some indications of it are reported in certain higher animals, but they are transitory. The location of the neuropore is apparently midway of the lamina terminalis.

Literature: C. v. Kupffer, Stud. z. vergleichenden Entwickelungsgesch. des Kopfes d. Kranioten, i (1893). Compare also the account of A. Willey, in Amphioxus and the Ancestry of the Vertebrates (1894). (H.H.)

Neurosis [Gr. *νεῦρον*, nerve]: Ger. *Neurose, Nervenbeschwerde*; Fr. *névrose*; Ital. *neurosi*. (1) Any activity of a nervous structure as such.

It is, no doubt, true that nerve-cells participate in the vital processes common to all

living structures, and there is undoubtedly a close connection between the nervous and non-nervous processes (cf. TROPHISM, and LIVING MATTER) which makes it difficult to separate the two classes. It might be well to limit 'neurosis' to the nerve processes which have an expression in consciousness, or, in other words, a corresponding 'psychosis.'

(2) A morbid or diseased condition of the nervous system. Functional neurosis is a morbid affection of the nervous system known only by its symptoms and without ascertained anatomical basis. It is doubtless true that an anatomical lesion of some kind does in each case exist, and the classification of diseases as organic and functional is but a concession to our ignorance. Cf. NEUROPATHY. (H.H.)

Neutrality (in law) [Lat. *neutralis*, through Fr.]: Ger. *Neutralität*; Fr. *neutralité*; Ital. *neutralità*. The relation to a belligerent power of another power which is at peace with each of the belligerents, and not an ally of either.

The neutral power is bound, by international law, to render no aid to either belligerent in its prosecution of the war. Its duties are not measured by its own municipal law. As to how far it should prevent its own subjects from giving such aid, the principles of international law are not settled. The United States and England incline to interfere less with the liberty of the citizen, in this respect, than the continental powers of Europe (see Davis, *Int. Law*, chap. xi). *Neutrality Laws*: the statutes of any particular state upon that subject. *Armed neutrality*: in which the neutral power arms to defend its neutral position against violence apprehended from, or offered by, a belligerent; in practice it is almost invariably the result of concerted action or alliances between several neutral powers (Woolsey's *Int. Law*, § 155). *Permanent neutrality*: the position of a state, like Switzerland, which by treaty with neighbouring powers stipulates never to declare war against them, except for a violation of her neutrality; they making corresponding promises. The United States have generally pursued a policy favourable to restricting within narrow limits the duties of neutrals (see Wharton's *Int. Law Dig.*, chap. xxi).

The doctrine of neutrality is a modern one, and originated with the trading cities of the middle ages. Its outlines are sketched, though lightly, by Grotius, the neutral being described as *medius* (*De Iure Belli et Pacis*, III. i. 5, xvii. 3; cf. Vattel's *Droit des Gens*, Lib. III. chap. vii; Cobbett, *Leading Cases in Int. Law*, Pt. III). (S.E.B.)

New Academy: see PLATONISM, and SCHOOLS OF GREECE.

Newman, John Henry. (1801–90.) Educated at Ealing and at Trinity College, Oxford. Fellow of Oriel, 1823; took orders in the Anglican Church, 1824; vice-president of St. Alban's Hall, 1825–6; tutor of Oriel, 1826–32; a university preacher at Oxford, 1830; travelled in Italy and Sicily, 1832–3; Vicar of St. Mary's, Oxford, 1828–43; joined the Roman Catholic priesthood, 1845; established at Edgbaston a branch of the brotherhood of St. Philip Neri; lectured in 1850–1; was tried for libel and found guilty; was made Cardinal, 1879.

Newton, Sir Isaac. (1642–1727.) Attended school at Woolsthorpe, Lincolnshire, and at Grantham. Entered Trinity College, Cambridge, 1660, where the philosophy of Descartes was prominent. He became subsizar, 1661; scholar, 1664; B.A., 1665; junior fellow and M.A., 1667; senior fellow, 1668; Dr. Barrow's successor as Lucasian professor of mathematics, 1669. On account of the plague (1665), he moved to his country home at Woolsthorpe, where he studied gravity. Member of the Royal Society of London, 1672. Discovered the law of universal gravitation, 1682. Became M.P. for Cambridge, 1689. On account of impaired health, went to Kensington to live, 1725, and died there. He was buried in Westminster Abbey.

Newton's Law (of colour mixture): see VISION, X.

Nexus [Lat. *nexus*, a bond, from *nectere*, to bind, tie]: Ger. *Nexus*; Fr. *nexus, lien*; Ital. *nesso*. The mutual dependence of different elements of an ordered series upon one another; same as connection or relation, but containing in addition a suggestion of union into an ordered whole; most frequently used in the phrase 'Causal Nexus.' (J.D.)

Nicolai, Friedrich. (1733–1811.) A self-taught philosophical critic. Attended the orphanage at Halle and the Real-Schule at Berlin. Apprenticed to a bookseller at Frankfort-on-the-Oder, he learned English and Greek in leisure hours, and read notes on lectures by Baumgarten. In Berlin he studied Wolff. He was for twenty-three years an editor, first of the Library of Fine Arts (1757–9), and later of the Universal German Library.

Nicolas of Cusa (or **Nicolaus Cusanus**),

Nicolaus Chrypffs (i. e. **Krebs**). (1401–64.) Received his first training at Deventer in the Society of the Brethren of the Common Life, founded by Geert de Groot. Studied law at Padua. Practised at Mainz (Mayence) until 1428, when he adopted the clerical profession. Deacon in Coblenz, 1431; member of the council of Basel, 1433; entrusted by Pope Eugenius IV with important commissions in France, in Constantinople, and at the Reichstag of Frankfort; appointed cardinal by Pope Nicholas V, 1448; bishop of Brixen, 1450. He made extended missionary journeys in Germany and the Netherlands, quarrelled with Archduke Sigismund of Austria, and was thrown into prison. Many of his writings are still unprinted.

Nidus [Lat.]: same in the other languages. (1) A cluster of nerve-cells within the central nervous system. Sometimes used in place of the more common term NUCLEUS (q. v.), on account of the ambiguity of the latter.

(2) A point of infection or centre of origin for a pathological process.

Nidus avis: a depression in the side of the vermis on the ventral aspect of the cerebellum, in which one lobe of the cerebellar hemisphere (the amygdala) is lodged. (H.H.)

Nietzsche, Friedrich Wilhelm. (1844–1900.) Born in Saxony and educated for the ministry at Bonn and Leipzig. Abandoning the clerical profession, he accepted (1870) a professorship in philology at Basle. While at Basle he became the friend of Wagner, whose musical dramas had fascinated him from childhood. In 1876, however, his taste for Wagnerian opera changed to disgust and hatred. About this time also began the first stages of a mental malady which wrecked the later years of his life. In 1880 he resigned his professorship and lived in health resorts. His literary activity was incessant, but in 1889 he became hopelessly insane.

Night-blindness: Ger. *Nachtblindheit*; Fr. *hémeralopie*; Ital. *nittalopia*. Unduly reduced vision in dim light or at night; it may vary in degree from slight discomfort to practical blindness.

The vision in daylight or strong light may remain nearly or quite normal. As a symptom it seems most usually associated with a form of intraocular disturbance (retinitis pigmentosa), while it occurs also as a specific disorder in cases of general malnutrition (anaemia, scurvy, fasting, &c.), and may then be regarded as a pathological exaggeration of the normal difficulty in vision in passing from a brightly illuminated to a dimly lit space. The opposite defect is termed day-blindness. Cf. HEMERALOPIA. (J.J.)

Nightmare [ME. *nightemare*]: Ger. *Alpdrücken*; Fr. *cauchemar*; Ital. *incubo*. A troubled dream, with a sense of oppression, fear, or terror.

The terror is often realized as the flight from a monster, the danger of an impending fall, the oppression of an horrible weight and the like. A sharp outcry or confused cry of alarm oftens accompanies the nightmare. See DREAM. (J.J.)

Night-walker: Ger. *Nachtwandler, Schlafwandler*; Fr. *somnambule*; Ital. *nottambulo*. Literally one who walks at night; but equivalent to sleep-walker. See SOMNAMBULISM. (J.J.)

Nihil est in intellectu *quod non prius fuerit in sensu* [Lat.]. The motto of SENSATIONALISM (q. v.).

Nihil ex nihilo [Lat.]. Nothing comes from nothing. Scholastic negative statement of the law of causal dependence. See CAUSE. (J.M.B.)

Nihilism [Lat. *nihil*, nothing]: Ger. *Nihilismus*; Fr. *nihilisme*; Ital. *nichilismo*. A term somewhat loosely used, generally by the opponents of a system, to designate its supposed tendencies; namely, to destroy existence, truth, or knowledge. In its strictest sense it means the belief that nothing is, and hence no knowledge is, possible; or that truth in knowledge and obligation in morality have no objective reality. In its contemporaneous use it generally denotes a political or social doctrine rather than a strictly philosophic one; the idea that social progress is to be looked for only in the abolition of all existing social institutions and a return to political void (e. g. Spencer's 'Administrative Nihilism'—Huxley); the extreme being ANARCHISM (q. v.).

This doctrine, however, is said to be derived from the emphasis laid on the negative in Hegel's dialectic, especially from the first categories of his *Logic*, in which the dialectical identity of being and non-being is asserted.

The first pure nihilist in philosophic theory was also the last, viz. the Sophist Gorgias of Leontium, who is reported to have taught: (1) that nothing exists; (2) that if anything did exist it would be unknowable; (3) if it existed and were knowable it could not be communicated. The doctrine thus stated has no modern supporters, but certain phases of the Buddhistic doctrine of NIRVANA (q. v.)

and of Schopenhauer's doctrine of the annihilation of will might be termed nihilistic. It is generally used nowadays by realists to mark their opinion of the idealistic doctrine of the external world, or, in a similar controversial way, to denote the tendency of doctrines of philosophical scepticism, such as Hume's. Fichte's words, as quoted by Sir W. Hamilton (edition of Reid's *Works*, 129, note), are often used as a proof of the nihilistic character of idealism, but in fact are employed by Fichte to express simply the logical outcome of a partial stage of development, not as a statement of his whole system.

Literature: Ueberweg, Hist. of Philos., i. 76–8; Reid's Works, 478; Fichte, Sittenlehre, Werke, iv. 151. The dependence of Russian nihilism upon a development of Hegel's philosophy is asserted by Kaufmann, Contemp. Rev., xxxviii. 913. (J.D.)

Nirvana [Sansk. *nis*, out, + *vana*, blowing]: Ger. *Nirvâna*; Fr. *nirvana*; Ital. *nirvana*. That state of blissful repose which the Hindu devotee realizes when, through the prescribed discipline of his religion, he has extinguished Karma or the principle of individual existence within him, and has thereby obtained deliverance from the doom of the Samsâra, or unending temporal cycle of deaths and reincarnations. See Oriental Philosophy (India).

Nirvana in its primary meaning has no temporal reference, and hence is not a state to be attained only after death. Death belongs to the Samsâra and is bound up with Karma. Nirvana is the condition reached by the soul that has crucified Karma by renouncing the desire for individual existence. The whole world of individuality, including death, is a sphere of Maia or illusion. Nirvana is freedom from illusion, and on its positive side absorption into, identification with, the blessed life of Brahm the absolute. Negatively, Nirvana may be characterized as the cessation of the striving for individual existence. As to its positive significance, Brahmistic and Buddhistic thought seem to differ; the latter, emphasizing the deliverance which is effected in Nirvana, tends to regard it as little more than the negation of existence, while to the former it is the realization of a man's Atman, his true and infinite self. Rhys Davids, following the Buddhistic interpretation, represents the Nirvana of Buddhism as simply extinction, while Deussen, speaking from the point of view of earlier Brahmistic conceptions, represents it as the realization on the part of the infinite of 'its own all-pervading, eternal, almighty nature.'

Literature: Deussen, Philos. of the Vedânta; Max Müller, Buddhist Nihilism, and art. on Buddhism in Encyc. Brit.; Concise Dict. of Religious Knowledge, art. 'India.' See the literature given under Oriental Philosophy (India). (A.T.O.)

Nisus [Lat. *nitor*, to struggle, to strive]: same in the other languages. The inherent tendency in any process of change to strive against obstacles towards its appropriate end. Leibnitz uses it as a quasi-technical term. He denies the existence of mere capacity or potency, holding that reality always issues in act. This remains as nisus or active tendency when hindered from expressing itself. In modern physical terms, it is practically the equivalent of energy of position, ready to translate itself into kinetic energy (Leibnitz, *New Essays*, ii. chap. xxi. § 2, and *On the Reform of Metaphysics*).

Nisus formativus is the supposed tendency inherent in every embryonic organism to reproduce the form of its species—a term of speculative biology. (J.D.)

Noctambulism [Lat. *nox*, night, + *ambulatio*, a walking about]: Ger. *Nachtwandeln*; Fr. *noctambulisme*; Ital. *nottambulismo*. Synonym of Somnambulism (q. v.).

Noetic [Gr. νοητικός, from νοητά, ideas which can be thought, not imaged, from νοῦς, reason]: Ger. *noëtisch*; Fr. *intelligible*; Ital. *noetico*. (1) Referring to concepts which originate in pure, that is, non-sensuous thought. In its more technical use, it excludes ideas arrived at from logical analysis of any sense material, or material imaginatively presented, and is confined to ideas supposed to be self-generated by reason. In a looser use, it denotes ideas freed from sensuous reference, independent of question as to mode of origin.

(2) Involving more or less cognitive process, as in the phrases 'noetic consciousness,' 'noetic Synthesis' (q. v.). See also Cognition.

The term anoetic is applied to consciousness, mental states, &c., which do not involve cognition, as, for example, hypothetical pure affection or conation. Cf. Stout, *Analytic Psychol.* (J.M.B.)

In accordance with their general philosophical presuppositions, the early Greek writers assumed that all distinctions in existence were the counterparts of distinctions in modes of knowing and vice versa. When it

was seen that certain experiences appeared to have permanent and general validity, while others had to do with the particular and changing, the tendency was to assume a superior form of knowing—reason—and an inferior—sense—and to divide the objective spheres accordingly. Heraclitus and Parmenides contributed to the distinction, but we owe its sharp formulation to Plato. With reference to his theory of ideas, he marks off sharply the incorporeal world, *τόπος νοητός*, the world of conceptions, from the world which is seen, *τόπος αἰσθητικός*, the world of perceptions. The first is the ultimate reality of which the second is but an image.

Aristotle, following Plato, uses the noun *νοητά* to express the essence of real beings taken in their intelligible aspect, their capacity of being rationally apprehended. As the Neo-Platonists made much of the doctrine of Nous (q. v.), so the adjective noetic played a large part in their system. The noetic cosmos (*κόσμος νοητός*) expressed the fact that the nous includes within itself a complete system of forms and forces as its own distinctions. Cudworth revived the term with practically the Aristotelian meaning. Sir William Hamilton used it to designate knowledge originated within the mind.

Literature: Plato, Rep., vi. 507 ff.; Phaedrus, 246 ff.; Phaedo, 100 D; Theaetetus, Symposium; Aristotle, De Anima, III. iv. 12; Plotinus, Enn., vi. 22; Cudworth, Eternal and Immutable Morality, Bk. II. i. 4, v. 2; Hamilton, Lects. on Met., xxxviii. See also Martineau, Types of Ethical Theory, 443–5. (J.D.)

Noise [OF. and ME. *noyse* and *noise*]: Ger. *Geräusch*; Fr. *bruit*; Ital. *rumore*. A sensation of hearing distinct from the sensation of tone; usually given as mixed noise and tone; characterized by intensity, duration, and pitch.

It is stimulated by air-vibrations of mixed or rapidly changing rates. It was formerly referred to the vestibule, but is now generally held to have its seat in the cochlea of the ear. Cf. Auditory Sensation under Hearing.

Literature: Helmholtz, Sensations of Tone, 7, 8; Ebbinghaus, Psychol., 283, 284. (E.B.T.–J.M.B.)

Nolition [Lat. *nolle*, to be unwilling]: Ger. *Wider-Willkürhandlung* (see below); Fr. *nolition*; Ital. *nolizione* (not in use—E.M.). Negative Volition (q.v.) or the will not to do.

A term not in general use, but convenient. An act of nolition is Contra-volitional (q. v.), and a decision of nolition is a Veto (see Fiat). 'Nolitio et aversio sensitiva non sunt actiones privitivae [unvolitional] sed positivae [contra-volitional]' (Ch. Wolff, *Phil. Pract.*, i. § 38, quoted by Eisler).

The German equivalent is suggested. Nolition is a form of Streben (conation) and also of Widerstreben (negative conation); but is confined to Willkürhandlung (volitional action) as narrower than Willenshandlung (voluntary action). (J.M.B., G.F.S.)

Nominal [Lat. *nominalis*, pertaining to a name]: Ger. *nominal*; Fr. *nominal*; Ital. *nominale*. Relating to a logical term, whether expressed in language or merely a concept of the mind, and not to anything real. Cf. Nominalism, and Realism.

Nominal definition (*definitio nominis*): the declaration of the essence of a word or expression, that is, the necessary and sufficient conditions of its applicability, or the enumeration of marks which suffice, but do not more than suffice, to give the meaning of the term, understanding by the 'meaning,' not the whole idea it may convey, but so much as it would require to be intended to convey in order to be a suitable word. Leibnitz says, 'Habemus quoque discrimen inter *definitiones nominales*, quae notas tantum rei ab aliis discernendae continent, et *reales*, ex quibus constat rem esse possibilem, et hac ratione satisfit Hobbio, qui veritates volebat esse arbitrarias, quia ex definitionibus nominalibus penderent, non considerans realitatem definitionis in arbitrio non esse, nec quaslibet notiones inter se posse coniungi. Nec definitiones nominales sufficiunt ad perfectam scientiam, nisi quando aliunde constat rem definitam esse possibilem.' This mode of making the distinction has been approved by many nominalists, as J. S. Mill. It cannot satisfy the realists, who demand of the real definition that it should express the real generating nature of the real species which it defines. As for the possibility of the thing, if by that is meant logical possibility, the nominal definition suffices. If more than that is meant, it is out of the province of definition to prove or declare a thing to be possible. A 'postulate' defines what is supposed to be possible; a 'problem' proves such possibility.

Nominal mode, in the doctrine of modals: a mode of a proposition expressed by an adjective, as 'Sortem currere est contingens.' (C.S.P.)

Nominalism [Lat. *nominalis*, from *nomen*, a name]: Ger. *Nominalismus*; Fr. *nominalisme*; Ital. *nominalismo*. The doctrine that universals have no objective existence or validity; in its extreme form, that they are only names (*nomina, flatus vocis*), that is, creations of language for purposes of convenient communication. See Realism (1) for full account and history. (J.D.)

Nomology [Gr. *νόμος*, law, + *λόγος*, doctrine]: for equivalents see the next topic. The science which investigates laws, as general psychology and general physics; contradistinguished from classificatory and explanatory science. Hamilton says, 'We have a science which we may call the nomology of mind —nomological psychology' (*Lects. on Met.*, vii). (C.S.P.)

Nomology (in law): Ger. *Nomologie, Gesetzeslehre*; Fr. *nomologie*; Ital. *nomologia*. Jural science; the science of the conformity of human actions to rules of conduct prescribed by law. 'Ethic is the science mainly of duties, while nomology looks rather to the definition and preservation of rights' (Holland, *Jurisprudence*, chap. iii. 25). The rules of conduct, with which it is conversant, are both those prescribed by the current standard of morality, and those of legislation (ibid. 26; Smith's *Right and Law*, § 51). (S.E.B.)

Non-A (in logic): same in the other languages. An expression occurring in the usual forms of statement of the principles of contradiction and excluded middle. It is a term which denotes whatever is supposed not to be denoted by A, and denotes nothing more. (C.S.P.)

Non-being: Ger. *Nichtseiendes, Nichts* (*Nicht-sein*); Fr. *non-être* (*néant*); Ital. *non-essere*. Literally, just the absence or negation of being; but in accordance with the Greek tendency to give (unconsciously) an objective meaning to all categories of thought, non-being (*μὴ ὄν, μὴ εἶναι*) was assumed as existent, until it became an object of dispute among philosophic schools as to whether non-being is or is not.

The Eleatics (Parmenides, 470 B.C.), who identified it with empty space, holding that everything must be full (or that all that is, is), denied its existence. The Atomists, however (Leucippus), needing a space for their discrete particles to move in, asserted that non-being (the Void, q.v.) was as real as being (the atoms). Plato (denying empty space as a fact) assumed a relative world of non-being (the counterpart of ignorance) as the opposite of his ideas, and, interpreting it also as space, regarded it as the matrix out of which the world was created. In not dissimilar fashion the theological doctrine of the creation of the world 'out of nothing' tended to give non-being a quasi-existence, as at least the background of the divine operation. Aristotle attempted to give the term a dynamic interpretation. As all nature moves between the potential and the completed, the potential at once is and is-not. On one side, it is the medium, the matter, through which the form realizes itself; and it is also the restraint which prevents the full exhibition of form, and which is responsible for failures and deviations from the main line of development. In the Neo-Platonists, non-being becomes a highly important category. As empty space and as privation it was the responsible factor in the development of the purely physical world and also the cause of evil. It is the absolute opposite of pure being, which yet, just because it is non-being, reduces the manifestations of being to lower levels. However naïve the Greek formulation, it is obvious that through the use of this term there were gradually developed two of the most serious problems of philosophy: one on the side of cosmology, as to the existence of a vacuum, and the possibility of motion without a vacuum; the other the metaphysical and ethical problem of the significance of the negative factor in the universe, of hindrance and imperfection. It is a metaphysical problem, as well as an ethical one, because the value of the concept of growth and development (of change which is qualitative) seems to imply a passage from the potential to the actual, or from (relative) non-being to being. The problem in the former sense was revived by Descartes and in the latter by Hegel. With Hegel, becoming (Werden), process, activity are the ultimate and absolute, and thus a negative factor is as necessary as is a positive. In the famous doctrine of the identity of being and non-being is contained the assertion that the immediate or 'first' being of anything negates itself, and thus passes away, and that this passing away turns out to be not complete disappearance, but a development of itself, and so a reconstitution of being upon a higher, more mediate (or significant) plane (cf. the recent development of the doctrine by Ormond, as cited below). Scotus and other mediaeval philosophers had already taught that since God creates the world out of nothing, nothing belongs to the essence of God.

Literature: PARMENIDES, v. 33, 35; ARISTOTLE, De Gen. et Corr., i. 8 (for Leucippus's doctrine), and also PLUTARCH, Adv. Coel., 4. 2; PLATO, Rep., v. 476–9, vi. 511; Timaeus; ARISTOTLE, Physics, iv. 2 (cf. ZELLER, Philos. d. Griechen, iii. 603–23); Met., Bk. XII; PLOTINUS, Enneads, iii. 6, 18; ST. AUGUSTINE, De Civ. Dei, xii. 2; SCOTUS, De div. Nat., iii. 19; HEGEL, Logic (lesser), §§ 87–8, and Werke, iii. 72–3 (larger logic); ORMOND, Basal Concepts in Philos. (1896). (J.D.)

Non compos mentis [Lat.]: Ger. same, or *nicht dispositionsfähig*; Fr. *incapable, non compos sui*; Ital. same, or *non compos sui*. Incapable through mental impairment or disease of conducting one's affairs; usually employed in a technical or legal sense; cf. COMPOS MENTIS. (J.J.)

Non-contradiction. The 'law of non-contradiction' is another name for the principle of CONTRADICTION (q.v.). See also LAWS OF THOUGHT. (C.S.P.)

Non-ego: Ger. *Nicht-ich*; Fr. *non-moi*; Ital. *non-io*. The opposite of the Ego; the not-me; the external object; the external world. Cf. EGO.

The term is of especial significance, as a technical term, in the philosophy of Fichte; it represents the second positing (the anti-positing—Entgegensetzen; see POSIT) of the Ego as that which limits and thereby stimulates and defines the more specific activity of the Ego. See Fichte, *Werke*, i. 101–5, and Fischer, *Gesch. d. neueren Philos.*, v. 438. (J.D.)

Non sequitur [Lat. for 'it does not follow']. A name which belongs to the slang of the universities for the *fallacia consequentis* (called by Aristotle *ὁ παρὰ τὸ ἑπόμενον ἔλεγχος*, *De Sophist. Elen.*, 167 b 1), which is, strictly speaking, a fallacy which arises from a simple conversion of a universal affirmative, or transposing a protasis and apodosis, or condition and consequent.

Thus Aristotle tells us that the Eleatic Melissus argued that the universe is ungenerated, since nothing can be generated by what does not previously exist. The universe, then, not being generated, had no beginning; and having no beginning, it is infinite. But, as Aristotle remarks, although everything generated has a beginning, it does not follow (*non sequitur*, *οὐκ ἀνάγκη δὲ τοῦτο συμβαίνειν*) that everything that has a beginning is generated. A fever, for example, is not generated. Such fallacies are extremely common. De Morgan (*Formal Logic*, 268) gives this example: 'Knowledge gives power, power is desirable, therefore knowledge is desirable.' But though whatever is desirable has some desirable effect, it does not follow that whatever has any desirable effect is desirable. An attack of yellow fever has the desirable effect of rendering it unlikely the patient will for a long time have another; still, it is not itself desirable.

But the majority of logicians not only confound this fallacy with the *post hoc, ergo propter hoc*, which Aristotle considers immediately after, but even define it as 'failure in the formal inadequacy of the reason' (Sidgwick, *Fallacies*, II. ii. 4), or as 'the introduction of new matter into the conclusion, which is not contained in the premises' (Hyslop, *Logic*, xviii. 2), or as 'the simple affirmation of a conclusion which does not follow from the premises' (De Morgan, loc. cit.), or as 'any argument which is of so loose and inconsequent a character that no one can discover any cogency in it' (Jevons, *Lessons in Logic*, xxi), or 'to assume without warrant that a certain conclusion follows from premises which have been stated' (Creighton, *Introductory Logic*, § 46). Very many logicians omit it altogether, which is better.

Aristotle, however, could not express himself more precisely: '*Ο παρὰ τὸ ἑπόμενον ἔλεγχος διὰ τὸ οἴεσθαι ἀντιστρέφειν τὴν ἀκολούθησιν.* That is, 'from thinking that the *consequentia* can be converted.' That is to say, thinking that because 'If *A*, then *C*,' therefore 'If *C*, then *A*.' Owing to the neglect of fallacies by the more scientific logicians, it is not easy to cite many who define the fallacy correctly. The Conimbricenses (than whom no authority is higher) do so (*Commentarii in Univ. Dialecticam Arist. Stagir., In lib. Elench.*, q. i. art. 4); also Eustachius (*Summa Philos.*, Tom. I, pars. III, tract. iii, disput. iii. 9. 3); also Cope, an admirable student of Aristotle, in his note on the *Rhetorics*, B. cap. xxiv. See also the *Cent. Dict.*, under 'Fallacy.' (C.S.P.)

Non-voluntary: Ger. *nicht-strebend*; Fr. *non-volontaire*; Ital. (not in use). ACONATIVE (q.v.). See also ACTION.

Noology [Gr. *νοῦς*, reason, + *λόγος*, theory]: Ger. *Noologie*; Fr. *noologie*; Ital. *noologia* (the equivalents are suggested). That part of philosophy which deals with intuitive truths of reason; as distinct from Dianoiology, which deals with truths discursively or demonstratively established.

A term suggested by Sir William Hamilton, Reid's *Works*, note A, § v, but having no currency. Hamilton probably derived it from

Kant (*Krit. d. reinen Vernunft*, 643). It is used by Crusius for psychology. (J.D.)

Norm (and **Normality**) [Lat. *norma*, a carpenter's square, a rule]: Ger. *Norm, Normalität*; Fr. *norme, normalité*; Ital. *norma, normalità*. (1) A standard type or pattern from which continuous departures are possible in opposite directions. (C.S.P.)

(2) In natural science: the usual, in form, size, and function. Normality is conformity to that usual.

Fluctuations and deviations from normality, both physical and mental, constantly occur, and when within moderate limits are still considered normal; when exceeding such limits they gradually pass into the ABNORMAL (q.v.). For examples of the use of this conception in psychological discussions see Maudsley, *Responsibility in Mental Disease*. (J.J.)

Norm and **Normative** (in the moral sciences): Ger. *normativ* (*normgebend*); Fr. *normatif*; Ital. *normativo*. The principle, whether truth or mode of reality, which controls action, thought, and emotion, if these are to realize their appropriate ends; the end as law. The norm of thinking is truth; of emotion, the beautiful; of volition, the good. These principles (and their corresponding philosophic disciplines) are hence termed normative. The three normative sciences are thus logic, aesthetics, and ethics.

Reference to a norm may be roughly taken to discriminate the philosophic from the natural sciences. The latter aim simply to describe phenomena and explain them in terms of laws or principles homogeneous with the facts. The explaining principles are, moreover, mechanical, having to do with conditions of manifestation in time. In the philosophic sciences, facts are interpreted with reference to their meaning, or value—their significance from the position occupied, or part played, by them in the total make-up of experience. The standpoint, moreover, is teleological, since the interest is not in the conditions of origin, but in the fulfilment of purpose in realizing their appropriate values. Whether this distinction is one of objective reality, or one of standpoint and method of treatment, is, however, itself a philosophic problem. According to some writers the distinction between concepts of origin and of value has a distinct ontological reference; according to others the significance is only methodological. That is to say, to the latter there are not two spheres, one of pure phenomena, the other of ends and values; but the distinction is one of standpoint for purposes of description and explanation. Cf. ORIGIN *versus* NATURE.

The term norm is closely related to the terms criterion and standard. Criterion applies, however, more definitely to the process of judgment; it is the rule or mode of control as employed to assist judgment in making proper discriminations. A criterion of beauty is the principle employed in arriving at correct estimates or appreciations; a norm of beauty controls (or is supposed to control) the facts themselves in their own meaning. The criterion thus has a more subjective connotation. The standard is the principle used to measure value, and to lay off a scale of values. The standard of beauty is that type or form to which the facts conform in the degree in which the term beautiful is applicable to them. It differs from the norm in that the objectively regulating character of the norm is not necessarily ascribed to it. It agrees with the criterion in referring especially to the process of judgment or evaluation, but differs in that it takes some objective form as its adequate embodiment or manifestation. The criterion is the deciding principle in forming judgments; the standard is the principle which gives content to the adequate judgment. The norm which regulates the value of the facts may also, of course, be the standard by which their relative worths are measured, and the criterion by which the individual is guided in arriving at a correct apprehension of these worths. (J.D.)

Normal (in economics) [Lat. *normalis*, from *norma*, a rule]: Ger. *normal*; Fr. *normal*; Ital. *normale*. (1) In the broad sense, action which conforms to observed economic laws. 'The course of action which may be expected under certain conditions from the members of an industrial group is the normal action of the members of that group' (Marshall).

(2) In the narrower sense, a normal adjustment is one which represents conditions of economic EQUILIBRIUM (q.v.), e.g. normal price.

The term normal price was brought into prominence, if not actually introduced, by Cairnes. 'A normal price is reached when the product has so adjusted itself to the demands of consumers that the market price affords the current rate of profit to the producer, who enjoys no extraordinary advantage. We may contrast market and normal price by saying that a market price is one at which, for the

moment, the supply is equal to the demand; while a normal price is one at which, as long as the existing state of things continues, the production is likely to be equal to the consumption' (Hadley). Cf. SUPPLY AND DEMAND. (A.T.H.)

Normal (in law): Ger. *regelrecht, normal*; Fr. *normal*; Ital. *normale*. Pertaining to the ordinary individual. 'The rights of a child, a lunatic, or a corporation, are abnormal' (Holland, *Jurisprudence*, chap. ix. 119; xi. 144; xiv. 288).

Literature: for a discussion of the normal rules of human conduct see HEINECCIUS, Elementa iuris Naturae et Gentium, Lib. I. chap. i. § 4, and chaps. iii and iv. (S.E.B.)

Normal School: Ger. *Lehrerseminar*; Fr. *école normale*; Ital. *scuola normale*. An educational institution for the preparation of teachers, chiefly for elementary schools; a training college for teachers.

The work of well-equipped normal schools embraces three kinds of activity: (1) instruction in the theory of education as founded upon psychology, ethics, and sociology; (2) instruction in the subject-matter to be taught; (3) direct contact with the problems of teaching in a model or practice school. In thirty-two of the United States the normal school has become an integral part of the public school system.

Literature: see Reports of Normal School Section of the Nat. Educ. Assoc. in the 'Proceedings' from 1871 to the present; also art. on 'Normal Schools' in Johnson's Univl. Cyc., revised ed. (C.DE G.)

Normal or **Standard Stimulus**: Ger. *Normalreiz*; Fr. *excitant normal*; Ital. *stimolo normale*. The stimulus taken as a standard in a series of experiments in which the stimulus is varied with reference to this standard. Cf. PSYCHOPHYSICAL MEASUREMENT METHODS. (J.M.B.)

Normative: see NORM.

Nota notae [Lat.]: The logical principle *Nota notae est nota rei ipsius*, that is, the predicate of the predicate is the predicate of the subject, which is laid down in several places by Aristotle as the general principle of syllogism. The principal passages are as follows:—

'When one thing is predicated of another as its subject, whatever is said of the predicate can also be said of the subject' (*Categ.*, iii. 1 b 10).

'Whatever is said of the predicate will hold also of the subject' (*Categ.*, v. 3 b 4).

'We say that something is predicated universally when nothing can be admitted as coming under the subject of which the predicate will not hold; and the same thing holds of negation' (1 *Anal. pr.*, i. 24 b 28). The term *nota notae* is from the first words of the original of this passage.

'Of whatever the species is predicated, the genus is predicable' (*Topics*, Δ. i. 121 a 25).

Some writers (as Hamilton, *Lects. on Logic*, App. VI. ii) imagine a distinction between the *nota notae* and the *dictum de omni*. Some have been so extravagant as to attribute the former to Kant, in whose *Falsche Spitzfindigkeit* (1762, ii) it is very likely that the precise phrase 'nota notae est nota rei ipsius' first occurs, though similar phrases, such as 'cui conveniunt notae eidem quoque convenit nomen,' are common in Wolf's and other logics of the 18th century. But it is clear that in Aristotle's mind it was one principle, essentially that which De Morgan well called the principle of the 'transitiveness of the copula.'

Aristotle, in the last but one of the above passages, seems to regard the *nota notae* as following from the definition of universal predication. To say that 'Any S is P' is to say that of whatever S is true, P is true. This amounts to deriving the transitiveness of the copula from the transitiveness of illation. If from A follows B and from B follows C, then from A follows C. This, again, is equivalent to the principle that to say that from the truth of X follows the truth of the consequence that from Y follows Z, is the same as to say that from the joint truth of X and Y follows Z. (C.S.P.)

Note [Lat. *nota*, a mark, a sign]: Ger. (1) *Klang*, (2) *Note, Tonzeichen*; Fr. (1) *son*, (2) *note*; Ital. *nota, suono*. (1) A 'musical' or COMPOUND TONE (q.v.), as specifically determined in a musical scale. Cf. CLANG.

(2) The written or printed symbol of the musical tone. (E.B.T.–J.M.B.)

Note-blindness: Ger. *Notenblindheit*; Fr. *cécité musicale* (or *notale*): Ital. *cecità musicale*. An infrequent symptom in disorders of the aphasic type, in which there is a loss of the power to read musical notes; it is thus, in the realm of music, the analogue of ALEXIA (q.v.). Cf. AMUSIA, and SPEECH AND ITS DEFECTS. (J.J.)

Nothing (Hegel's *Nichts*): see HEGEL'S TERMINOLOGY, sub verbo. Cf. also NON-BEING.

Notion: Ger. *Begriff* (concept), *Gedanke*

(thought; no exact equivalent, see below); Fr. *notion*; Ital. *nozione*. (1) Sometimes used generally for any kind of apprehension of an object rather than actual perception; but (2) it is better to restrict its application to that element in the apprehension of an object which does not consist in an image.

The general application of the word to any cognitive state is illustrated by the following passage from Reid (*Works*, Hamilton's ed., i. 289): 'The word notion, being a word in common language, is well understood. All men mean by it the conception, the apprehension, or thought which we have of any object of thought. A notion, therefore, is an act of the mind conceiving or thinking of some object. The object of thought may be either something that is in the mind, or something that is not in the mind. It may be something that has no existence or something that did, or does, or shall exist. But the notion which I have of that object is an act of my mind, which really exists while I think of the object; but has no existence when I do not think of it.' The more restricted usage which we propose is suggested by Berkeley (*Princ. of Human Knowledge*, Pt. I. § 142): 'We may not, I think, strictly be said to have an idea of an active being, or of an action, although we may be said to have a notion of them. I have some knowledge of my mind and its acts about ideas, inasmuch as I know or understand what is meant by these words, What I know, That I have some notion of. I will not say that the terms idea and notion may not be used convertibly, if the world will have it so, but yet it conduceth to clearness and propriety that we distinguish things very different by different names. It is also to be remarked that, all relations including an act of the mind, we cannot so properly be said to have an idea, but rather a notion of the relations and habitudes between things.'

Without committing ourselves to the statement that there are no ideas of relation or even of activity, we agree with Berkeley that some such distinction as he suggests would be very useful. All those modes of cognitive consciousness which are called by James 'psychic fringes,' 'feelings of tendencies,' 'sense of whence our thought is coming and whither it is going,' should be called 'notional' in accordance with the usage we recommend. Under the same head would be brought that 'understanding of the meaning of words' which seems independent of the mental imagery suggested by them. It should be noted that we do not wish to imply that notional consciousness ever exists in complete severance from mental imagery, though the imagery is often merely verbal. Nor do we, like Berkeley, simply identify idea and image. The idea must include an image: but it also includes whatever notional 'fringe' serves to give the image meaning or significance. Any object considered as an INTENT (q.v.) is necessarily an object of notional consciousness.

As to the German usage, Begriff has served, like concept in English, to cover the whole ground. Wundt (*Grundriss d. Psychol.*, § 17, B) marks off the 'ideational elements,' calling them the Gesammtvorstellung; but it remains to find a term for the notional part. Possibly something might be said for Meinen, seeing that Meinung is suggested for the corresponding consciousness of intent. Both French and Italian admit a distinction of terms as suggested. (G.F.S.—J.M.B.)

Notion (Hegel's *Begriff*): see HEGEL'S TERMINOLOGY, VI, *d*.

Notochord [Gr. *νῶτος*, back, + *χορδή*, string]: Ger. *Rückensaite, Chorda, Wirbelsaite*; Fr. *corde dorsale, notocorde*; Ital. *notocorda*. A rod of peculiar tissue constituting the primitive axial skeleton of vertebrates.

It begins immediately behind the pituitary body, and extends to the caudal extremity. It occurs as a permanent structure in fishes, and as a temporary one in the embryos of amphibia, reptiles, birds, and mammals, being functionally replaced in the adult of these forms by the vertebral column, which is evolved around the notochord. Comparative embryology has shown that it is a greatly modified epithelial band, which arises in the embryo from the median dorsal line of the entoderm, being in position and mode of development somewhat analogous to the ectodermal medullary canal, or primitive tubular nervous system.

Literature: MINOT, Human Embryol., 181; GEGENBAUR, Vergleichende Anat. d. Wirbelthiere (1898); R. WIEDERSHEIM, Compar. Anat. of Vertebrates (trans., 1897). (C.S.M.)

Noumenon, and **-al** [Gr. *νοούμενον*, anything known, from *νοεῖν*, to perceive, know]: Ger. *Noumenon* (*-al*), DING AN SICH (q.v.); Fr. *noumène* (*-al*); Ital. *numeno*. The object of pure thought, or of rational intuition, free from all elements of sense. See PHENOMENON, and MUNDUS INTELLIGIBILIS.

Plato uses the term a number of times, but simply in connection with *νοῦς* and *νοεῖν*, as

the intelligible, the things of thought, e. g. *Parmenides*, 132; *Republic*, vi. 508.

Kant uses the term generally as equivalent with thing-in-itself; that is, the thing, as *not* object of sense; and hence as something which can only be thought. But in his *Dialectic* he ascribes to thought, as over and above sensuous schematism, specific functions; namely, (1) to limit the world of sense and phenomena, by making us aware of a possible world of reality beyond; (2) to afford an ideal of totality, which can, indeed, never be realized, but which serves, none the less, as a standard to suggest and to regulate, so as to give the greatest possible completeness to experience. For this Kant uses, indeed, the term idea rather than noumenon, but as its basis of definition is exactly the same (the reference to reason transcending experience), it was impossible that the two should not be confused. Through the practical Reason, the world of Noumena, or Things-in-themselves, thus left open as a theoretical possibility, is found to be a practical reality in the consciousness of duty. And in the *Critique of Judgment*, the teleological principle lying at the basis of science mediates between the noumenal and the phenomenal, not indeed asserting the existence of the former, but treating the latter as if the noumenal were its ground. It was the aim of Fichte and of Kant's successors to combine systematically the objective sense of noumenon, the thing-in-itself, and the subjective—the ideal of knowledge—which Kant had brought together only in a confused way. Reinhold is conscious of this confusion, and accordingly carefully discriminates the thing-in-itself, as the source of the 'matter' of our perceptions, from the noumenon, as denoting the unrealizable ideals and problems which thought sets to experience. The thing-in-itself here has more kinship with phenomena than with noumena. See Kant, *Critique of Pure Reason*, 217–26, 249–52 (Max Müller's trans.); *Proleg.*, §§ 44, 57 (in this latter, the three meanings of thing-in-itself, limit to sensibility, and ideal of rational completeness are practically identified); *Critique of Practical Reason*, Bk. I. chap. i. Pt. II; *Critique of Judgment*, 427–8 (Bernard's trans.). Kant seems to have used the term as equivalent to the ancient *νοητά*, which was opposed to *αἰσθητά*. According to Vaihinger (*Commentar zu Kant*, 117) Kant was indebted especially to Sextus Empiricus. For Reinhold, see Erdmann, ii. 479. (J.D.)

Nous [Gr. *νοῦς*, reason, thought]: Ger. *Nus* (K.G.); Fr. *intelligence*; Ital. *nous*. Reason, thought, considered not as subjective, nor as a mere psychic entity, but as having an objective, especially a teleological, significance.

We owe the term, as a technical one, to Anaxagoras. He felt the need of a special principle to account for the order of the universe and so, besides the infinity of simple qualities, assumed a distinct principle, which, however, was still regarded as material, being only lighter and finer than the others. To it, however, greater activity was ascribed, and it acted according to ends, not merely according to mechanical impact, thus giving movement, unity, and system to what had previously been a disordered jumble of inert elements. It is probable, however, that he limited its importance to the stellar heavens; or, at least, used it only when mechanical principles failed. Diogenes of Apollonia identified nous with air, and extended its action to organic bodies. Plato generalized the nous of Anaxagoras, proclaiming the necessity of a rational (teleological) explanation of all natural processes, and making nous also a thoroughly immaterial principle. As the principle which lays down ends, nous is also the Supreme Good, the source of all other ends and aims; as such it is the supreme principle of all the ideas. It thus gets an ethical and logical connotation as well as a cosmological.

On the other hand, nous gets a psychological significance as the highest form of mental insight, the immediate and absolutely assured knowledge of rational things. (Knowledge and the object of knowledge are thus essentially one.) Here *νοῦς* is distinguished from *διάνοια* (sometimes called *ἐπιστήμη*, and sometimes *τέχνη*), which is discursive knowledge, and hence dependent upon assumptions, which cease to be such (and hence are unproved hypotheses) until carried back to the self-evident things of reason. Aristotle continues this line of thought, and practically identifies *νοῦς* as the supreme end, and thus the unmoved mover, or source of all motion, with God, whose activity is *νόησις νοήσεως*, the thinking of thought; an expression which makes explicit and absolute the virtual assumption of Plato regarding the unity of *νοῦς* as faculty of highest knowledge and the *νοητόν* as the supreme object of knowledge. This divine nous is transcendent, moving the world only teleologically, not immanently nor yet causally. As transcendent it is, while

immanent in human beings, yet separable from the body (*χωριστός*) and, as such, imperishable. In man, however, the *νοῦς* assumes a dual form: the active (*νοῦς ποιητικός*), which is free and the source of all man's insight and virtue that links him to the divine (*θεωρεῖν*), and the passive (*νοῦς παθητικός*), which includes thoughts that are dependent upon perception, memory—experience as mediated through any bodily organ. Some of the Peripatetic followers of Aristotle, such as Theophrastus and Strato, appear (like his later Arabian followers) to have denied the transcendence of nous, to have given it a material and sensuous colouring, and thus to have prepared the way for the Stoics. It is with the Neo-Platonists, however, that the conception of nous becomes all-important again. The Absolute is, indeed, above all distinctions, and so cannot be regarded as, in itself, conscious or as reason. But its first distinction is into nous on one side, and being on the other. Nous thus becomes the conception for the absolute reason and subject. Moreover, it possesses a dynamic and self-differentiating quality, and is thus plural (*νοῖ*) as well as singular. As noi it is the source of all the dynamic principles which operate in the creation of the universe. With the Neo-Platonists the conception reaches its zenith. The distinction (of Kant, but particularly as used by Coleridge) of REASON from UNDERSTANDING (q. v.) may, however, be compared with it, but the modern distinction of the subjective from the objective inevitably gives reason a much more psychological sense than nous possessed with the ancients.

Literature: PLATO, Phaedo, 97; Republic, vi. 508; and Sophist, 254; ARISTOTLE, Metaphysics, i. 3, 984; SIMPLICIUS, Phys., 33, and 225 a; PLOTINUS, Enneads; ZELLER, Philos. d. Griechen, ii. 590–2, iii. 512, 528–9. (J.D.)

Novation (in law) [Lat. *novatio*, a renovation]: Ger. *Umschaffung, Novation, Neuerungsvertrag*; Fr. *novation*; Ital. *novazione*. The substitution, by mutual consent, of a new obligation for an old one.

It may be a new obligation of the same party, or an obligation of a third party. In either case the old obligation is extinguished. If the obligation of a third party be substituted, he must consent to the arrangement.

'Novatio est prioris debiti in aliam obligationem vel civilem vel naturalem transfusio atque translatio: hoc est, cum ex praecedenti causa ita nova constituatur, ut prior perimatur. Novatio enim a novo nomen accepit, et a nova obligatione' (*Dig.*, xlvi. 2, *De Novationibus et Delegationibus*). Cf. Gaius, *Commentaries*, iii. 176.

Literature: a compendious discussion of the subject is to be found in Holtzendorff's Encyc. d. Rechtsw., sub verbo. (S.E.B.)

Now: see PRESENT (specious), and TIME (perception of).

Nucleus [Lat. *nucleus*, a kernel]: Ger. (1) *Zellkern*, (2) *Kern*; Fr. *noyau*; Ital. *nucleo*. (1) The functional and structural centre of a CELL (q. v.). The structure which seems in some way to dominate the vital processes of the cell.

(2) Often used also for cell clusters within the central nervous system.

The second use of the term, though ambiguous, is strongly intrenched in the prevalent usage. Nidus and nidulus have been proposed instead.

With reference to their fibrous connections we distinguish nuclei of origin from terminal nuclei, the former originative, the latter receptive. Thus the primary nuclei of the motor nerves are nuclei of origin, those of the sensory nerves terminal nuclei with reference to those nerves. Practically every nucleus belongs to both classes, and will receive one or the other name according to whether the cellipetal or the cellifugal impulses are considered. (H.H.)

Nullibrists: Ger. *Nullibristen* (Eisler); (not in use in the other languages). A term applied to those who deny that the soul exists in space, since it is simple and immaterial.

Used by Henry More (*Enchir. met.*, 27, 1). It has no currency. (J.D.)

Number [Lat. *numerus*, through the French]: Ger. *Zahl*; Fr. *nombre*; Ital. *numero*. How many; cf. NUMBER CONCEPT. (J.M.B.–G.F.S.)

(1) We think of certain designated things as constituting a 'group' or 'assemblage,' whenever, without ignoring the separateness of the things from one another, we separate them from all other things, not individually, but as a whole, and thus make them collectively a single object of our attention.

(2) Let us call two groups of things 'equivalent,' when it is possible to bring the elements of the one into a relation of one-to-one correspondence with the elements of the other.

Thus the groups of letters, *A, B, C, D*, and *E, F, G, H*, are equivalent, since by matching *A* with *E*, *B* with *F*, *C* with *G*, and *D* with *H*,

we are able to set up a relation of one-to-one correspondence between them.

(3) We may think of all possible groups of things as distributed into *classes* of equivalent groups. A relation of one-to-one correspondence may be established between every two groups which belong to the same class, but not between two groups which belong to different classes.

The property which is common to all groups which belong to the same class, and which distinguishes the groups of one class from those of another class, is the number of things in a group, or its cardinal number. In other words :

The cardinal number of any group of distinct things is that property which is common to the group itself and every group which can be brought into a relation of one-to-one correspondence with it.

Thus the number of things in a group may be described as the fundamental 'invariantive' property of the group, that is, as the property which remains unchanged during all changes (transformations) to which the group may be subjected, except such as affect the distinctness of the things themselves or their common distinctness from all other things.

(4) A 'finite' group may be defined as a group which is equivalent to no one of its parts.

From this definition it follows that if the first of two finite groups be equivalent to a part of the second, the second cannot be equivalent to the first or to any part of the first.

Let M and N represent any two finite groups. It must be the case that—

either (i.) M is equivalent to N,

or (ii.) M is equivalent to a part of N,

or (iii.) N is equivalent to a part of M;

and, as we have just seen, these three cases are mutually exclusive.

In the case (i.) M and N have the same cardinal number. In the case (ii.) we say that the cardinal number of M is 'less than' that of N; in the case (iii.) that the cardinal number of M is 'greater than' that of N.

(5) By starting with a group which contains but one thing, and repeatedly adding one new thing, we arrive at the following scheme of the cardinal numbers :—

(i.) The cardinal number of a group like I, which contains but a single element;

(ii.) The cardinal number of a group like II, obtained by adding a single element to a group of the first kind;

(iii.) The cardinal number of a group like III, obtained by adding a single element to a group of the second kind; and so on, indefinitely.

It can be shown to follow from (4) that every cardinal contained in this scheme is finite, that every finite cardinal is included in the scheme, and that no two of these cardinals are equal.

Moreover, as thus arranged, the cardinal numbers constitute a never-ending 'ordinal system,' each cardinal following every lesser and preceding every greater cardinal.

(6) If a relation of one-to-one correspondence can be set up between two groups, either group may be used as a 'numeral symbol' for the other; for the two groups have the same cardinal number, and, generally speaking, no other property in common.

The primitive numeral symbols were groups of fingers or of marks, such as I, II, III, . . ., standing in this relation of one-to-one correspondence to the groups which they represent numerically. These are natural or immediate numeral symbols, but they are serviceable for the smaller cardinals only. The more highly developed races have therefore devised various artificial methods of representing the cardinal numbers, by systems of numeral words, as 'one,' 'two,' 'three,' &c., or conventional symbols, as 1, 2, 3, &c. These are the so-called 'natural numbers.'

(7) Arranging these symbols in an order corresponding to that already given the cardinals themselves, we have the never-ending scheme: 1, 2, 3, 4, . . ., which is sometimes called the 'scale of the natural numbers.'

All relations of greater and less among the cardinals are indicated by the relative positions of the corresponding symbols in this scale.

(8) Arithmetic is concerned primarily with the relations which exist among the natural numbers, and with certain operations by which these numbers may be combined.

The operation which lies at the basis of arithmetic is 'counting.'

We count a group of things by bringing it into a relation of one-to-one correspondence with a group of fingers or with a part of the natural scale. The process leads to the knowledge of the cardinal number of the group by yielding a familiar symbol for this number—in the one case a finger-symbol, in the other the last of the numeral words 'one,' 'two,' 'three,' &c., used in the count.

It can readily be shown to follow from the definition of finite group (4) that the result

of counting such a group is independent of the order in which the count is made.

This may be regarded as the fundamental theorem of arithmetic. The various operations of arithmetic all stand in a more or less immediate relation to counting. Thus, addition is an abbreviated form of counting, and subtraction is the inverse of addition; multiplication is an abbreviated form of addition, and division the inverse of multiplication. We are speaking, of course, of the primary meanings of these operations, when both the numbers which they combine, and the results of the combinations, are *natural* numbers.

(9) Thus far we have been considering the natural numbers only. But the complete number-system of arithmetic, algebra, and analysis also includes several classes of 'artificial' numbers: the negative, fractional, irrational, and imaginary numbers. These numbers were invented to express relations not immediately expressible in terms of the natural numbers; but they may be defined independently of such relations, by generalizing the ordinal property of the natural number-system.

(10) First of all we enlarge the natural scale 1, 2, 3, . . . into a scale on which it is possible to count backward with the same freedom as forward, by inventing the new numbers: 0, −1, −2, &c., and placing 0 before 1, −1 before 0, −2 before −1, &c. The new numbers are thus *defined ordinally*, each being characterized by its position in the enlarged ordinal scale.

(11) Next we invent the *fractions*, defining them *ordinally* as follows:

Combine any live natural numbers a and b to form the symbol $\frac{a}{b}$. Read simply 'a over b.'

In particular, let $\frac{a}{1} = a$.

Then arrange all possible symbols of this form ordinally in accordance with the rule:

'$\frac{a}{b}$ shall precede, follow, or coincide with $\frac{c}{d}$ according as ad precedes, follows, or coincides with bc.'

The integral and fractional numbers, positive, negative, and 0, together constitute the 'rational' number system. This system possesses a property not belonging to the natural system: viz. between every two numbers of the system there are other numbers of the system.

(12) We can, in various ways, separate all the numbers of the rational system into two classes, C_1 and C_2, so related that—

(i.) Each number in C_1 is less than (i.e. precedes) every number in C_2.

(ii.) There is no greatest (last) number in C_1, and no least (first) number in C_2.

We obtain such a separation, for instance, if we assign to C_1 all numbers whose cubes are less than 2, and to C_2 all numbers whose cubes are greater than 2.

Corresponding to every such separation we invent a new number, called an *irrational number* (e.g. $\sqrt[3]{2}$), assigning it a place after all numbers in C_1 and before all numbers in C_2, and so defining it ordinally.

The rational and irrational numbers together constitute the 'real' number system. This system is 'continuous'; see CONTINUITY (in geometry).

(13) Finally, we add to the number system a new unit i, such that $i^2 = -1$, and then create a new continuous ordinal system (the system of 'pure imaginary numbers') in which the relative positions of any two numbers ai and bi are the same as that of the numbers a and b in the system of real numbers.

The real and imaginary numbers are combined by 'addition' into numbers of the form $a + ib$, called 'complex numbers,' and the complete number-system of analysis consists of all possible numbers of this form.

(14) The operations by which the natural numbers may be combined have experienced a corresponding generalization. But the generalized addition and multiplication are, like the addition and multiplication of the natural numbers, characterized by conformity to the laws:

$$a+b = b+a$$
$$a+(b+c) = (a+b)+c$$
$$ab = ba$$
$$a\,(bc) = (ab)\,c$$
$$a\,(b+c) = ab+ac;$$

subtraction is still the inverse of addition, division the inverse of multiplication, &c.

(15) In conclusion, we may call attention to two further extensions of the number-concept:

(i.) By the creation of complex numbers involving other fundamental units than 1 and i (Hamilton's *Quaternions*, Grassmann's *Ausdehnungslehre*, &c.).

(ii.) By the creation of transfinite cardinal and ordinal numbers (Georg Cantor). (H.B.F.)

Literature: G. CANTOR, in Mathematische

Annalen, xlvi. 489; DEDEKIND, Essays on Number (Eng. trans., 1901), comprising trans. of Irrationale Zahlen and Was sind und was sollen die Zahlen? (in which the cardinal attribute of number is derived from the ordinal attribute); in the same connection see papers by HELMHOLTZ and KRONECKER in the volume commemorative of the Zeller-Jubiläum; various articles in recent volumes of the Rev. de Mét. et de Mor., by COUTERAT, POINCARÉ, and others; PEIRCE, Proc. Amer. Acad. Arts and Sci., Sept. 10, 1867; and Amer. J. of Math., iv. 85 (1881); H. B. FINE, The Number System of Algebra; and College Algebra (1901); WALTER BRIX, Der mathematische Zahlbegriff, in Philos. Stud., v and vi. (H.B.F.–J.M.B.)

Number (in metaphysics). According to the Pythagoreans, numbers constituted the essence or reality of things. They were the first and ultimate elements out of which things are composed. Plato in his later doctrine (taught orally) seems to have called the Ideas numbers. The Neo-Platonists and Neo-Pythagoreans regarded metaphysical numbers as the archetypes of arithmetical numbers, and the animating principles of things. See ONE (the).

Nicholas Cusanus and the Platonists of the early Renaissance gave great place to number in their cosmologies, being clearly influenced by the new mathematical developments. The mystics have in all ages given importance to numbers and their relations, as either prototypes or symbols of the deepest things in experience. Three (the union of the odd and even), four (the first square), seven (the sum of four and three), twelve (the product of three and four) have been especially honoured. (J.D.)

Number Concept: Ger. *Zahlbegriff*; Fr. *concept* (or *idée*) *de nombre*; Ital. *concetto di numero*. The thought of plurality or manyness, abstracted from the particular determinations indicated by 'how many,' 'so many,' &c., and from any definite arrangement or order.

The number concept involves on this definition: (1) reference to a group of objects considered as having some sort of connection with one another; (2) complete abstraction from the characteristics which distinguish these objects from one another; (3) the thought of the objects as distinguishable and capable of being variously and indifferently grouped and arranged. (G.F.S.–J.M.B.)

This analysis of the number concept is in fundamental accord with the theory of NUMBER (q. v.). The apprehension of GROUP (q. v.) precedes that of number, and the comparison of groups gives the 'more' or 'less' which is the first stage in the genesis of the number concept (see below). It involves the notion of the substitution of equal groups for one another and of like individuals within the same group. The idea of one-to-one correspondence of the groups *inter se* is a second step, by which mere inequality of groups gives place to numerical more or less, expressed by units. The third stage or step is reached when the notion of substitution becomes that of rearrangement of neutral units within the group itself, together with possible interchange of units from group to group. This is made possible by abstraction from the concrete characters of the members of both groups. It is probable that in this latest stage the device of measurement enters; by it a single constant unit is held for one-to-one comparison with members of the group (or determines such units in a continuous magnitude). But the use of measurement involves the earlier stages of the number concept, since the unit of measurement is itself a numerical abstraction. For a theory which derives the number concept from a form of rudimentary measurement see McLennan and Dewey, as cited below.

Genetically, it is likely that the struggle to accommodate to situations involving groups of objects precipitates comparisons of quantity and size, and this in turn yields a rudimentary sense of number. The writer's child H. for a considerable period distinguished 'one' from 'too-free' (two-three: a general term for plurality), but did not further distinguish different cases of plurality. The conception of unity probably does not arise until from the treatment of various inequalities of groups (possibly the most favourable case is that of *greater and smaller occurring together*, with reference to a familiar group which lies between them) 'two' and 'three' are distinguished from each other and also from 'one.'

The necessity of abstracting from the concrete characters of objects is seen in the difficulty in counting found by primitive peoples who have no adequate abstract symbols. The fingers seem to have served as counting instruments in many cases and to have been represented in pictographic signs. Early peoples, however, seem to have reckoned, as in the payment of debts (expressed

in number of objects, such as cattle), *in kind*— sheep for sheep, oxen for oxen, &c. This shows the number concept still lacking in completeness; the one-to-one correspondence has been reached, but not the idea of abstract substitution of units as between different groups.

Literature: DEDEKIND, Was sind und was sollen die Zahlen?; RIEHL, Philos. Krit., II. i. 73; WUNDT, Logik, i. 468; SCHUPPE, Logik, 102; JERUSALEM, Die Urtheilsfunction, 254; MCLENNAN and DEWEY, The Psychol. of Number. (J.M.B., G.F.S.)

Number Form: Ger. *Zifferform*; Fr. *schème* (or *diagramme*) *numérique*; Ital. *schema numerale*. The form of SYNAESTHESIA (q. v.) in which the digit numbers and their combinations are given a scheme or arrangement in space by a manner of imaging peculiar and necessary to the individual.

The term is extended also to similar forms for other series, such as the letters of the alphabet, the months of the year, &c. For illustrations see SYNAESTHESIA. (J.M.B.)

Numenius. Born in the latter half of the 2nd century A.D. in Apamea, Syria. A Neo-Pythagorean who prepared the way for Neo-Platonism.

Numerical [Lat. *numerus*, number]: Ger. *Zahl-* (in compounds, as *Zahldifferenz*); Fr. *numérique*; Ital. *numerico, numerale*. If two bodies move in the same orbit and differ in no respect but that of being at any one instant in different places, they are said to be numerically different. Whether or not it is quite accurate to say that they differ only in this, that there are two of them, it is sufficiently so to account for the origin of the phrase. Numerical difference is individual difference, apart from all qualitative unlikeness. Numerical identity is being strictly the same individual. Cf. the different topics IDENTITY, DIFFERENCE, and INDIVIDUAL.

This adjective in logical phrases usually translates the Greek *ἀριθμῷ*. Some writers have doubted whether the Greek word is here to be understood in an arithmetical sense, and have seemed to suspect that it was a relic of some original and different signification of the word. But this is hardly called for.

A numerically definite syllogism is one the force of which depends upon the relations of numbers; as 'Most of the men at a certain gathering wore dress-coats, and most of them had white neckties. Hence, some of those who wore dress-coats had white neckties.' (C.S.P.)

Nutrition [Lat. *nutritio*, a nourishing]: Ger. *Ernährung*; Fr. *nutrition*; Ital. *nutrizione*. (1) The series of vital processes by which living organisms transform food materials into the substances of their own bodies: anabolic processes. See ANABOLISM.

(2) Substances capable of thus being transformed into living tissues, nutriment. (C.F.H.)

Nyāya Philosophy: see ORIENTAL PHILOSOPHY (India).

Nyctalopia: see HEMERALOPIA, DAY-BLINDNESS, and NIGHT-BLINDNESS.

Nymphomania [Gr. *νύμφη*, a nymph, a bride, + *μανία*, madness]: Ger. *Nymphomanie*; Fr. *nymphomanie*; Ital. *ninfomania*. A morbid and uncontrollable sexual desire in woman (in man termed Satyriasis).

It appears as a symptom in various mental disorders, but particularly in acute mania, and at times forms the chief indication or the initial symptom of such disorder. Nymphomania refers particularly to the morbid passion for sexual intercourse, while Erotomania refers to the excessive mental concentration on ideas concerning love, courtship, and mating. (J.J.)

O

O (in logic). Symbol for the particular negative judgment — Some men are not white. Cf. A. (J.M.B.)

Obedience and **Disobedience** [Lat. *obediens*, from *obedire*, to obey]: Ger. *Gehorsam, Ungehorsam*; Fr. *obéissance, désobéissance*; Ital. *ubbidienza, disubbidienza.* Obedience is personal submission in intention and action to an authority imposed upon the individual; disobedience is intentional refusal or omission of such submission. If the authority be to something internal, it is still recognized as quasi-external or not self-imposed: so Socrates' obedience to his Demon, and St. Paul's to his 'heavenly vision.'

Obedience is a recognized factor in the training and also in the development of the social nature of the child. In education the question has been as to how far obedience can be inculcated by the enforcement of commands. In social psychology obedience has been recognized as an important factor in what has been called social HEREDITY (q.v.); and Bain makes it a schoolmaster to morality — the obedience to a 'word of command' standing for and anticipating the recognition of the moral law. (J.M.B.)

Object (**-ive**; general and philosophical) [Lat. *ob*, off, over against, + *iacere*, to throw, to lie; the equivalent of Gr. *ἀντικείμενον*, usually translated *oppositum*]: Ger. *Gegenstand, gegenständlich, Objekt, objektif*; Fr. *objet, objectif*; Ital. *obbietto, oggetto, obbiettivo.* (1) That in which the mind's activity terminates; that towards which any mental operation is directed. But since the TERMINUS (q.v.) of intellect and of volition may be distinguished, this most general sense easily breaks up into two others. (2) That which is known, considered as giving truth and reality to the knowing process. (3) That which is the goal of impulse or choice—aim, end, ultimate purpose. But since the problem of knowledge has been chiefly as to how the external world may be known (knowledge of states of consciousness being taken as a matter of course), (4) object is often used popularly to mean 'thing.' (5) Combining with the philosophical sense, it then is set over against mind and consciousness as the external, often the material, world. This tendency is strengthened by the use of the word SUBJECT (q.v.) to denote mind, and is one of the two chief meanings of the adjective objective. (6) That which is known may also be distinguished from that which is only erroneously assumed or accepted—from that which we deceive ourselves into believing; hence object is used as equivalent to real. This sense is not common with the noun, but is most frequent with the adjective objective, which designates that which belongs really to any subject-matter as distinct from that which is imported or reflected into it through the prejudices, illusions, fallacies, or errors of the person observing or judging: opposed to that which is *merely* in the mind. It is (2) above made more specific. (7) Objective then comes to mean the intrinsically real, or self-subsistent, having validity in itself—e.g. 'duty is objective.' (8) In later scholastic philosophy, object and objective are used exclusively to denote that which exists simply and only as material of mental operations. The use is continued in Descartes and is found in Berkeley, who expressly calls the existence of objects *as perceived* their objective existence.

The history of the transformation of this earlier meaning to the later ones will be found under SUBJECT. Cf. the next topic. (J.D.)

Literature: EUCKEN, Gesch. d. philos. Terminol.; thirty pages of citations in EISLER, Wörterb. d. philos. Begriffe. (J.M.B.)

Object (mental or psychic): Ger. *Objekt*; Fr. *objet*; Ital. *obbietto*. Whatever consciousness in any way cognizes or, cognizing, feels any kind of interest in.

The flight of a bird, the immortality of the soul, the ultimate constitution of matter, a man's personal identity, a toothache, an algebraic equation, social reform, the moral ideal—all these are objects if and so far as anybody attends to them. The definition indicates a distinction between objects of interest and objects of cognition. But in ultimate analysis it would seem that knowing never takes place without some interest in the object, and evidently we cannot be interested in anything without having some cognizance of it, however vague and rudimentary. Objects as such exist for us only so far as we attend to them. But when we attend there is always some need, craving, appetite, inclination, whim, or other form of conative tendency, which seeks satisfaction in the object attended to. Cf. OBJECTIVE (in psychology).

It will be noticed that we give the word 'object' the widest possible meaning. Our justification is that for this wide application no other word or form of expression can be conveniently substituted for it. Pikler (*The Psychology of Belief in Objective Existence*) uses the term *obiectiva* where we should speak of objects. But there is no need for introducing a Latin word where a common and familiar English term is available. There is, however, a tendency in some writers to limit the application of the term to material objects. But there is no sufficient ground for this restriction. If we use the term for any object of consciousness, whatever its nature may be, we can easily indicate when we wish to refer to 'material objects' by calling them material. In the same way we can speak of psychological objects, mathematical objects, ethical objects, and so on. Cf. OBJECT AND OBJECTIVE. For the self considered as object see SELF, and REFLECTION. (G.F.S., J.M.B.)

Object-blindness: Ger. *Seelenblindheit*; Fr. *cécité psychique*; Ital. *cecità psichica* (*degli oggetti*). See BLINDNESS (mental).

Object-lesson: Ger. *Anschauungsunterricht*; Fr. *enseignement intuitif, leçons de choses*; Ital. *lezione obbiettiva*. A class-room exercise upon a concrete object, such as an animal, plant, or mineral.

A course of such lessons was once thought essential to a good school; it is now generally recognized that object-lessons are much more effective when made an early or concrete stage of the regular instruction in the various studies. Cf. OBSERVATION, FORMAL STEPS, and METHOD.

Literature: CALKINS, Object-lessons. In Proceedings of the National (U.S.) Educational Association, as follows: SHELDON (1863), 93–102; WILBUR (1864), 189–209; GREENE (1865), 245–70; LOTHROP (1870), 49–64, 155, and (1872), 17; CALKINS, in various volumes since 1872. (C.DE G.)

Object Self: see SELF.

Objection [Lat. *obiectus*, from *ob* + *iacere*, to throw]: Ger. (1) *Einwendung* (*Einwand*), (2) *Vorwurf*; Fr. *objection*; Ital. *obiezione*. Opposition taking the form of (1) dissent, which is opposition to a truth or proposition, or (2) disapproval, which is practical opposition. The opposing statement, or the ground of opposition, is called 'an objection.' (J.M.B.)

Objective (in psychology): Ger. *Objektiv*; Fr. *objectif*; Ital. *obbiettivo*. Sometimes used as synonymous with physical or material, but for psychological purposes it is better to define as follows: Whatever belongs to the nature of the object as cognized, in distinction from the processes of cognition, feeling, and willing. (G.F.S.–J.M.B.)

The term 'objective' especially indicates the controlling and determining function of the object in relation to subjective process. The object, whether characterized by reality feeling or by explicit belief, prescribes to subjective activity the conditions of its efficiency. Subjective interest seeks satisfaction. But the means by which satisfaction is to be attained can only be revealed by trial. Subjective activity is always a process of experimentation; the result of the experiment depends on the object. It is predetermined by the nature of the object. This holds good whether the satisfaction sought is practical or merely theoretical.

Practical success depends on adjustment to conditions independent of our wish or will. A cat attempting to escape from a cage may claw, bite, push, and pull, now in this direction and now in that. But whether it will escape, and if so, how, is predetermined by the structure of its prison. It can only experiment. A man constructing a piece of machinery for a given purpose must

adjust himself to the nature of his material and its mechanical, physical, and chemical laws. All such activities involve an experimental attitude, and in the result of the experiment the nature of the object is revealed. You take a spade and try to dig. You may at will determine the amount and direction of effort put forth, but the result is beyond your direct control. You cannot by mere subjective selection determine whether the ground shall prove yielding or unyielding, or whether the spade shall break or not.

The outcome of previous activity yields knowledge of the object, which defines and determines subsequent activity. In so far as previous effort is found to fail, new adjustment follows. Unsuccessful lines of action are discontinued or modified, and successful lines maintained and repeated. In this way the development of cognition is one with the development of conation. As knowledge becomes more precise, complete, and differentiated, so activity becomes more precisely, completely, and distinctively adjusted to objective conditions. 'It is the essence of conation to seek its own satisfaction. But success is possible only in so far as it has acquired a definite and determinate character. The more blind a craving or impulse is, the more helpless it is. The new-born infant feels the craving of hunger, and manifests it by diffuse movements and by cries. Its craving is exceedingly indeterminate, inasmuch as it has no cognizance of the special object which would satisfy it or of the means of attaining this object. Hence the felt want cannot work out its own satisfaction. The mother or the nurse must do for it what it cannot do for itself. . . . On the other hand, as a vague craving takes more definite shape, the infant becomes more and more capable of fulfilling its own wants. Throughout this process the original conation is an essential factor. It tends to define itself, and the gradual acquisition of knowledge through experiment is but another expression for the process whereby the originally blind craving becomes more distinct and differentiated. To this growing differentiation and distinctness correspond more and more special and complex movements. Thus the vague craving becomes the relatively definite impulse to suck the breast. Soon the infant, which could not at first find the nipple, points to the bottle. Further development brings preference for this or that kind of food, the use of knife and fork, and the earning of money to buy nourishment' (Stout, *Analytic Psychol.*, ii. 83 f., somewhat revised).

In principle, what has been said of practical activity applies also to theoretical activity. In practical activity, our interest requires in its gratification the production of some change in the object other than the mere transition from being less known to being more known. On the other hand, theoretical interest is satisfied by a mere increase of knowledge. None the less, it is an interest, just as much as hunger, or thirst, or love of money. And the conditions of its satisfaction are inherent in the nature of its object, and are revealed in the processes of mentally experimenting with the object. If I am curious about the colour and other characters of a bird which happens to catch my eye, I look hard at it, and possibly use a field-glass. But when I thus take the initiative, the result does not depend on me, but on the objective conditions. Perhaps the bird flies away before I can examine it. In that case my curiosity is balked. The end of my activity was merely to have that activity determined and defined by its object. But if the bird flies away, the objective control which I am seeking is denied. If it waits to be scrutinized, the result depends on it, not on me. I want to know whether its breast is black or blue or red. But it is the object itself which decides in favour of one of these alternatives to the exclusion of the others. It is the same with higher processes. I attempt to solve a geometrical problem, and on my own initiative take this or that step. But the result depends not on me, but on the condition of the problem, the nature of space, and so forth. Or I attempt to follow the transitions in Hegel's *Logic*; as Hegel very rightly says, all I have to do is simply to fix my attention on absolutely indeterminate being, with the view of finding it intelligible. It absolutely refuses to be intelligible unless I supplement it with other conceptions. Thus it grows and develops before my eye. But its growth and development arise from its own nature. I only give it an opportunity by setting my attention in a certain direction—by experimenting with it in a certain way. Cf. EXPERIMENTATION, SELECTIVE THINKING, and TRUTH. (G.F.S.)

Objective Right: Ger. *objektives Recht*; Fr. *droit objectif*; Ital. *diritto obbiettivo*. The first stage in the dialectical evolution of morality is, according to Hegel, that of 'Abstract Right.' This stage is otherwise described as 'Objective Right,' in its opposition

to the next stage, that of 'Morality' or 'Subjective Right.' See Hegel, *Rechtsphilos.*, Introd., § 26 (Dyde's trans., 32–4). (J.S.)

Objectivism [for der. see OBJECT]: Ger. *Objectivismus*; Fr. *objectivisme*; Ital. *oggettivismo*. (1) The theory which attributes objective validity to at least some of our ideas, and thus regards the mind as capable of attaining real truth. Opposed to scepticism and to phenomenalism.

(2) The theory which tends to neglect the mental and spiritual in its theory of reality.

(3) The theory, in ethics, which conceives the aim of morality to be the attainment of an objective state (so Külpe, *Introd. to Philos.*, §§ 14 and 30). Cf. SUBJECTIVISM. (J.D.)

'Objectivity' is applied both (1) to products or creations, and (2) to thinkers, artists, agents, &c., which illustrate objectivism in any of these meanings. (J.M.B.)

Objectivity: see OBJECTIVISM.

Obligation (in law) [Lat. *obligare*, to bind]: Ger. (1) *Obligation, Schuldverpflichtung*, (2) *Schuldverschreibung*; Fr. *obligation*; Ital. *obbligazione*. (1) A legal duty of one person to do something or abstain from doing something for the benefit of another.

It confers or implies a right to service. In strictness, it implies an actionable right, and thus excludes mere parental obligations (Pollock, *Jurisprudence*, chap. iv. 84).

(2) A writing expressing such a contractual duty, generally under seal.

'Obligatio est iuris vinculum quo necessitate adstringimur alicuius rei solvendae, secundum nostrae civitatis iura' (*Inst. of Just.*, iii. 14, *de obligationibus*). The constitution of the United States forbids any state to pass a law impairing the obligation of a contract. A charter of a private corporation is a contract within the meaning of this provision.

Literature: POTHIER, Obligations; SAVIGNY, Das Obligationenrecht. (S.E.B.)

Obligation (moral): Ger. (*sittliche*) *Verpflichtung*; Fr. *obligation* (*morale*); Ital. *obbligazione* (*morale*), *obbligo*. That which is binding or authoritative in the nature of morality. (J.S., J.M.B.)

The problem of moral obligation may be said to be the central and all-inclusive problem of ethics—the science of the 'ought' as distinguished from the natural sciences or sciences of what 'is.' Thus Sidgwick says that both ethics and politics are 'distinguished from positive sciences by having as their special and primary object to determine what ought to be, and not to ascertain what merely is' (*Meth. of Eth.*, 1), since 'the fundamental notion represented by the word "ought" or "right,"' which is contained expressly or by implication in all ethical judgments, is 'essentially different from all notions representing facts of physical or psychical experience' (ibid., 27). The notion of oughtness or obligatoriness is, on this view, 'ultimate and unanalysable,' unique, the fundamental category of moral judgment; and the function of ethics is to determine the content of obligation: what we ought to do, or what it is reasonable or right to do. The notion of obligation implies, further, a conflict between rational and non-rational motives. 'In fact, this possible conflict of motives seems to be connoted by the term "dictate" or "imperative"; which describes the relation of reason to mere inclinations or non-rational impulses by comparing it to the relation between the will of a superior and the wills of his subordinates' (ibid., 36).

As a specific ethical problem, or as an explicit statement of the ethical problem itself, however, the problem of moral obligation is one that has arisen in modern times. The question of the obligatoriness of certain forms of action is closely connected with that of the authoritativeness of the law which prescribes them. The explicit question, Why ought I to do this or that? arises with the separation of the action, in its formal principle, from the end, of the 'ought' from the 'good.' The Greek moralists asked: What is the good of this or that action?—and so ultimately: What is *the* good? Preoccupied with the beauty and attractiveness of the good, and tending always more or less to a hedonistic interpretation of it, they were not so apt to raise the question of its obligatoriness or imperativeness: the authoritativeness of the good lay in its goodness. Modern moralists, on the other hand, have asked: What ought I to do, and why ought I to do it? What are the true laws of conduct, and what is the source of these laws and of their validity? 'For the ego-centric point of view is substituted the homocentric' (Fonsgrieve, *Essai sur le libre arbitre*, 479); for the teleological point of view is substituted the formalistic and the juridical. Further, the homocentric point of view is also, primarily at least, the altruistic. The question is: Why ought I to regard the good of others as well as my own, and at the expense of my own? The problem of moral obligation passes into that of social and political obligation.

Kant's distinction between the categorical imperative of morality and all other imperatives, as merely hypothetical, is epoch-making, and may be regarded as the definitive formulation of the modern, as distinguished from the ancient, view of morality. Still, we cannot say, with Renouvier (*Sci. de la Mor.*, 95), that this Kantian distinction amounts to 'a complete reversal of the ancient point of view of the human mind as to the essence of morality.' For the Greek moralists all imperatives are hypothetical, that is, means to ends, except one, the supreme end itself. It is only because modern moralists, on the contrary, have separated the problem of the ought from that of the good, because they have rested in the conception of the rightness of the actions or in that of their conformity to law, that they have regarded moral imperatives as categorical. Even for Kant the ultimate ground of the categorical character of the imperative of morality is found in the ultimateness of the moral end, in the character of the moral being as an end-in-himself; and the recognition of such an end by the Greek moralists makes the morality, which is the means of its attainment, categorically, and not merely hypothetically, imperative.

The intrinsic inseparableness of the problems of obligation and end, of oughtness and goodness, is suggested by the utilitarian, and often egoistic, solution of the modern problem of duty, as well as by the conception of duty which results from the ancient conception of good. At the same time, important differences result from the difference in starting-point. When this is duty, we are generally offered a doctrine of sanctions, a more or less external interpretation of moral obligation; when this is the good, its obligatoriness is conceived as intrinsic, and is rather an implication than an explicit attribute of morality.

The problem of moral obligation receives two main or typical solutions, and both are found alike in ancient and in modern ethics. The first may be called the rationalistic, the second the hedonistic or utilitarian. Ultimately, it is the difference in the conception of the end or good that determines the difference in the interpretation of obligation. Not only so, but a hedonistic view of the end seems logically to negate obligation as an ultimate category. As Sidgwick says, ethical hedonism is incompatible with psychological hedonism; and hedonism is generally psychological. It seems unmeaning to say that I *ought* to seek happiness—my own, at all events. Accordingly it is to Kant's anti-hedonism or extreme rationalism that we must trace the intensity of his insistence upon the categorical character of moral obligation, or conversely. It is chiefly to the prevailing hedonism of Greek ethics, on the other hand, that the comparative unimportance of its doctrine of obligation is to be traced. Yet even hedonism has its doctrine of obligation, and in Greek ethics we find rationalism as well as hedonism.

That the virtuous or excellent life, the life which attains the good, is a life 'according to right reason,' is the fundamental conviction not only of Aristotle, but of his predecessors, Socrates and Plato. It is a doctrine common to the Stoics and Epicureans, and finds its earliest philosophical expression in Heraclitus. As a conviction of the ordinary moral consciousness, it is rooted in the Greek regard for reason as the source of order, not merely in human life, but in the universe itself. The 'measure' which is the secret of reality and of beauty, as well as of virtue, is set by reason. All fair and noble activity is subject to the law of reason; the mark of a base and ignoble act is that it transgresses this law. The one has form, the form which reason alone can give; the other is without form, because it is devoid of reason. The fundamental and inclusive virtue is that temperance or moderation which consists in observance of the limit set by reason.

Heraclitus anticipates the Stoics in the explicit assertion of the obligatoriness, for man, of obedience to 'the divine law from which all human laws draw their sustenance,' the law of the common or universal reason, the true 'nature' of man, as of all things. In obedience to this divine law, as contrasted with the promptings of ungoverned appetite, he finds the secret of human happiness.

For Socrates, Plato, and Aristotle alike man is, in his true nature, a rational or reflective being, and his true or characteristic life is, therefore, the rational or reflective life, the life obedient to law, as contrasted with the lawless life of unrestrained animal appetite. For all three philosophers wisdom is, if not the sum, at any rate the presupposition, of virtue. And if Socrates tends to trace the obligatoriness of the rational life to its pleasantness, and to resolve all virtue into prudence, Plato and Aristotle regard it as in itself obligatory upon man as a rational being. The question, Why should I act rationally? is—they would say—a meaningless, because an irrational, question. For both Plato and Aristotle the

completely rational life, the life of reason itself, is the life of thought or philosophy. The life of ordinary human activity has only a secondary or incomplete rationality: it should, or ought to, be a life according to reason. The highest form of this life is found in the state, which is the individual 'writ large.' From the psychological point of view, Plato regards the supreme virtue of righteousness (δίκη) as consisting in the obedience of the spirited (θυμός) and appetitive (ἐπιθυμία) elements of human nature to the rule of reason (λόγος). Righteousness, or complete virtue, consists in the doing of its own proper work by each part of the soul; and reason's work is not merely to rule, as that of impulse is to obey, but, as legislative, to determine the work of the other parts. The obligatoriness of the rational life is implicit in Aristotle's view of human good (εὐδαιμονία). This consists in ἐνέργεια ψυχῆς, that is, in the actualization of the human (= rational) life-principle or self. Such true self-realization takes various forms in the various rational or excellent human activities and habits, which are all found to be cases of the mean or rational amount.

It is in the ethics of the Stoics, and especially of the Roman Stoics, that the conception of obligation becomes most explicit. The Stoics not only define virtue as living conformably to nature (ὁμολογουμένως τῇ φύσει ζῆν), but distinguish two degrees of such conformity: (1) καθῆκον, outward conformity or 'fitness'; (2) κατόρθωμα, inward conformity or 'rightness.' For the cynic scorn for law as mere convention (νόμος) they substitute reverence for it as the expression of the divine order of the universe. The Roman Stoics develop this legalistic conception of life, and especially the idea of the universal validity of social obligation, of that law of nature and of nations which binds together all members of the human race as partakers in a common reason, and makes them citizens of a common state.

The juridical view of morality received a new expression in Christianity. The Jewish rabbis had elaborated a complicated and casuistical interpretation of the divine law. For the outward and mechanical conformity which such a method encouraged, Christianity substituted the inward conformity of will and disposition, demanding righteousness of motive and intention, and not merely of outward act. It also interpreted righteousness, after the manner of the Hebrew prophets, on its social as well as on its divine side, identifying the love of God with the love of man. In spite, however, of the characteristic inwardness of Christian morality, and of the exaggerated expression of this tendency in the 'antinomianism' of the early Christian centuries, there grew up in the middle ages an elaborate system of ecclesiastical jurisprudence, a new Christian casuistry. Along with this there came to prevail a double standard of virtue and duty, a distinction between ordinary and monastic virtue, between those things which are obligatory upon all (commands) and those things which are merely 'counsels of perfection.' The Reformation marks the revival of the principle of inwardness, of the essential unity and absolute obligatoriness of all virtue, and of the right of the individual conscience to determine for itself all questions of duty.

Modern ethics begins with the effort to discover an independent basis of moral obligation in the nature of things, in reason, divine or human, rather than in the will of God. Grotius defined 'natural right' (*ius naturale*) as 'the dictate of right reason, indicating that an act, from its agreement or disagreement with man's rational and social nature, is morally disgraceful or morally necessary.' Hobbes, while denying that man is by nature a social being, yet recognizes certain 'laws of nature,' and regards certain forms of conduct as indirectly, if not directly, rational. The early British rationalists—Cudworth, More, Cumberland, and Clarke—insist upon the essentially rational, and therefore natural, character of all duty as determined by the immutable and eternal relations of things. They reassert, against Hobbes, the essentially social nature of man and the ultimateness of social obligation. This ethical rationalism is developed by Butler, who finds the seat of authority in the rational principles of human nature, conscience, self-love, and rational benevolence. As a rational being, man is a law unto himself: he has the rule of right within, in the constitution of his own nature, in which the rational or reflective principles are clearly fitted to govern, and the impulsive or unreflective principles to obey. 'We are constituted so as to condemn falsehood, unprovoked violence, injustice, and to approve of benevolence to some preferably to others, abstracted from all consideration which conduct is likeliest to produce an overbalance of happiness or misery.' This doctrine of the intrinsic nature of moral distinctions and obligations is further developed by the later

intuitionists, who maintain the absoluteness and ultimateness, because rationality, of moral principles, and insist upon the authority of conscience as the revealer of such principles.

This rationalistic view of moral obligation has provoked an opposite view, that of the hedonistic or utilitarian school. According to this view, the consciousness of moral obligation is the individual's sense of the compulsoriness of right conduct; the 'ought' is the echo of the 'must.' Its source is to be found, therefore, in the 'sanctions' of such conduct, or in the penalties attached to the violation of moral law. These sanctions are primarily, as in Paley's theory, theological. By later utilitarians they are conceived as the natural consequences of wrong-doing, and more particularly as its social and political consequences, the penalties with which public opinion, whether politically organized or not, visits the transgression of its laws. According to Paley, a man is said to be 'obliged' when he is 'urged by a violent motive resulting from the command of another.' This definition is virtually anticipated by Gay, in his Dissertation prefixed to Law's translation of King's *Origin of Evil* (1731): 'Obligation is the necessity of doing or omitting something in order to be happy.... Full and complete obligation, which will extend to all cases, can only be that arising from the authority of God.' To Paley's religious sanction Bentham adds three others, the physical, the political, and the moral or popular. The physical or natural sanction he regards as the basis to which all the others may be reduced. For Mill, as for his predecessors, obligation is synonymous with motivation. His answer to the question, What is the source of the obligation of utilitarian morality?' consists in an account of its sanctions. Earlier moralists have erred, he thinks, in limiting themselves to the external sanctions. Far more important than any of these is the internal or psychological sanction, the 'feeling of unity with our fellow men,' the sympathy which binds us to our fellows and constrains us to act for their interest, even at the sacrifice of our own. Mill thus discovers the obligation, in the sense of motivation, of altruistic conduct in an altruistic impulse which is irreducible to terms of egoism; while, in his insistence upon the intrinsic superiority of certain pleasures or satisfactions, and upon the right of the 'higher' feelings to control the 'lower,' he commits himself implicitly to a doctrine of obligation of the rationalistic type.

The evolutionary utilitarians seek to account for the feeling of obligation by tracing its genesis. According to Spencer, the political, religious, and social controls are only the pre-moral controls within which the strictly moral control evolves, and from which it gradually emancipates itself. The former account for the coercive element in obligation; the latter constitutes the authoritative element, and consists in the consciousness of the intrinsic evolutionary superiority of the more complex, representative, and later-evolved feelings as principles of conduct, to the simpler, presentative, and earlier evolved. With moral progress, the consciousness of obligation, in the former sense, tends to disappear, giving place to spontaneity. Of this evolutionary or naturalistic view of moral obligation an extreme statement will be found in Guyau's *Esquisse d'une Morale sans Obligation, ni Sanction.*

As against the hedonistic and utilitarian interpretation of obligation, the rationalistic view has been reasserted by modern idealists, first in Germany and later in England and America. For Kant, the founder of this idealistic movement, all morality is summed up in the word duty, and in a sense which negates pleasure and disregards consequences. Duty is a matter not of act, but of motive. The good or dutiful will is the will that is moved simply by reverence for law, or for its own rational nature. Such a will is autonomous, a law unto itself, because an end-in-itself. For Hegel this subjective or 'conscientious' attitude is only a stage between 'abstract right,' or external legality, and that 'ethicality' in which the individual recognizes his unity with his fellows, and sees in the ethical institutions—the family, society, and the state—the concrete and objective expression of the universal reason and the ultimate ground of individual obligation. The latter view has found expression in Green's *Prolegomena to Ethics*, Bradley's *Ethical Studies*, and more recent works in English which, while reducing all specific duties to the fundamental duty of self-realization, yet, by interpreting the true or ideal self as the social self to which the lower and false, or merely individual and selfish, self ought to be sacrificed, emphasize the social aspect of moral obligation. This has also been emphasized, from the psychological point of view, by Bain, Baldwin, and others. Cf. ETHICS, ETHICAL THEORIES, DUTY, LAW, and SANCTION.

Literature: GEORGES FULLIQUET, Essai

sur l'Obligation morale (1898); FRED BON, Über das Sollen u. das Gute (1898); J. MARK BALDWIN, Social and Eth. Interpret. (1898); works on Ethics generally; BIBLIOG. F, 2, *j*. (J.S.)

Obscurantism [Lat. *obscurare*, to darken]: Ger. *Obscurantismus*; Fr. *obscurantisme*; Ital. *oscurantismo*. Opposition to intellectual progress or enlightenment arising out of ignorance or fear of the effects which enlightenment will produce on traditional institutions and beliefs; the principles of those who practise such opposition. (A.T.O.)

Observation [Lat. *observatio*, from *observare*, to look at]: Ger. *Beobachtung*; Fr. *observation*; Ital. *osservazione*. Attentive experience; especially, an act of voluntarily attentive experience, usually with some, often with great, effort. Cf. the following topics.

More or less fixity in the object is requisite. Indeed, experience supposes that its object reacts upon us with some strength, much or little, so that it has a certain grade of reality or independence of our cognitive exertion. All reasoning whatever has observation as its most essential part. Whatever else there is in the act of reasoning is only preparatory to observation, like the manipulation of a physical experiment.

Much stress has been laid upon the distinction between 'sciences of observation' and 'sciences of experiment'; and undoubtedly there is a great contrast between the proceedings, let us say, of the anatomist and of the physiologist. Although the anatomist has to make many experiments (with stains, for example), yet the stress of his labour comes upon the act of observation; while the preparations for observation of the physiologist are far more elaborate, and the mere act of observation itself often very easy and coarse. The difference is, however, chiefly one of degree, and from a philosophical point of view is of quite secondary importance. (C.S.P., J.M.B.)

Observation (errors of): see ERRORS OF OBSERVATION.

Observation (mental): Ger. *Selbst-* (or *innerliche*) *Beobachtung*; Fr. *observation de soi*; Ital. *osservazione* (*interna*, also *introspezione*). (1) The deliberate examination of what is in one's own mind, with consciousness of the act itself; called 'self' or 'inner' OBSERVATION (q. v.). Cf. REFLECTION.

The term thus defined is useful to indicate reflection for purposes of examination, and not merely as designating the reflective state of mind in general. One observes when he reflects, but when he observes he reflects for a purpose. Observation is the means of INTROSPECTION (q. v.).

(2) A second use (which is not recommended) makes observation synonymous with mere awareness of the progress of experience.

Literature: JAMES, Princ. of Psychol., i. chap. vii; BRENTANO, Psychologie; LADD, Psychol., Descrip. and Explan., chaps. i, ii. (J.M.B.–G.F.S.)

Observation (method of, in education). The acquisition of knowledge by direct sense-perception.

At one time teachers were inclined to regard observation as a method complete in itself, programmes being supplied with courses of so-called object-lessons. Educators are now disposed to view observation as but one step or stage in a rational method. This is, at all events, the position of the Herbartians. See METHOD, and INTUITION (in education).

Literature: Index to Proceedings of the National (U.S.) Educational Association; N.A. CALKINS, Object Lessons. (C.DE G.)

Observations (adjustment of): Ger. *Beobachtungsrechnung*; Fr. *calcul des observations*; Ital. *ordinamento dei risultati d'osservazione* (suggested—E.M.). The department of experimental or scientific method concerned with the treatment of experimental results to determine their evidential value.

The method of procedure in adjusting the results of a series of observations depends upon the nature of the particular problem had in view. The number and distribution of cases, the ERRORS OF OBSERVATION (q. v.) of various sorts, the comparison of the results of one series with another, the elimination of accidental cases or of those vitiated by this condition or that—these are some of the questions concerning which exact analysis is required. An illustration of such adjustment of observations is presented under VARIATION (statistical treatment of). In many cases the application of the theory of PROBABILITY (q. v.) is demanded. (J.M.B.)

Observer: see SUBJECT (of experiment).

Obsession [Lat. *obsessio*, a besieging]: Ger. *Besessenheit*; Fr. *obsession*; Ital. *ossessione*, *fissazione*. (1) The explanation of marked neurotic and abnormal mental symptoms in a patient as due to the persevering efforts of an evil spirit to gain mastery over him.

It differs from POSSESSION (q. v., as also DEMONOMANIA) in that it emphasizes the efforts of the demon from without, while in possession the demon is supposed actually to

be resident in the body, and must accordingly be exorcized by appropriate agencies.

(2) The persistent and irresistible presence of an idea or emotion; in this sense equivalent to an IMPERATIVE IDEA (q. v.). (J.J.)

Obversion [Lat. *obversio*, a turning]. Hamilton (*Lect. on Logic*, xiv, and especially Appendix V. iii) states that CONVERSION (q. v., also for foreign equivalents) in logic is sometimes called obversion.

This is a surprising statement, which neither he nor his editors are able to support by citations. It is, therefore, not unlikely that Hamilton took it at second hand.

Bain (*Logic*, Pt. I. Bk. I. chap. iii. § 27) says: 'In affirming one thing, we must be prepared to deny the opposite: "the road is level," "it is not inclined," are not two facts, but the same fact from its other side. This process is called obversion.' Bain gives no reference. The regular scholastic name for the process he describes—a name given by Abelard (*Dialectica*, 225)—is *infinitatio*. This word is very common (see, for example, Albertus Magnus in II. *Peri hermeneias*, iii; Ockham, *Logica*, II. xii, xiii; and the index to Prantl, *Logik*, iv). But somebody may have got the notion that it was 'barbarous,' and have preferred to use a more classical-sounding designation. (C.S.P.)

Occam (or **Ockham**), **William of**; so called from Ockham, England. Studied at Merton College, Oxford; became a Franciscan, 1319, and then studied at Paris under Duns Scotus. He became the most eminent of Nominalists. He opposed the pretensions of the pope to political power and the possession of property. He was finally summoned to trial, and took refuge (1328) with Emperor Louis of Bavaria. He never signed the article of recantation, although he sought peace with the pope late in life. He died in 1347. See OCCAMISM.

Occamism: Ger. *Occamismus*; Fr. *doctrine d'Occam*; Ital. *dottrina di Occam*. The doctrine held by the followers of William of Occam, the founder of scholastic Nominalism (see REALISM). They were also called Terminists, because of the doctrine of Occam that universals are not anything really existing, but are only *termini*, predicables. (J.D.)

Occam's Razor: see PARSIMONY.

Occasion (-al): see OCCASIONALISM, and CAUSE.

Occasional Cause: see OCCASIONALISM.

Occasionalism [Lat. *occasio*, an event]: Ger. *Occasionalismus, Theorie der Gelegenheitsursache* (occasional cause); Fr. *occasionalisme, hypothèse des causes occasionnelles*; Ital. *occasionalismo*. The theory that matter and mind do not act upon each other directly, but that upon occasion of certain changes in one, God intervenes to bring about corresponding changes in the other. Each is then called the 'occasional cause' with reference to the other.

The theory was developed by Geulincx and Malebranche in order to deal with the problem—arising from the extreme dualism asserted by Descartes between thought and extension—of the interaction of mind and matter in general, and of the body and soul in particular, combined with the growing difficulties felt in forming any intelligible theory of causation. The same problem was dealt with in the single-substance theory of Spinoza and the Leibnitzian doctrine of pre-established harmony. Descartes in general had asserted that all changes of matter-in-motion are to be accounted for by reference to extension, while all psychical matters are to be referred to the nature of mind. This latter theory, however it might do for clear and adequate ideas, could not explain confused ideas and the passions and emotions connected with them. Here was an exception, and God had arranged in man a co-existence of the two substances, so that a disturbance of the 'animal spirits' (centring in the pineal gland) excited in the mind an unclear idea, whether sensation, passion, or emotion. This doctrine of *influxus physicus* was so obviously contradictory to the rest of the system, that the Cartesians at once set about doing away with it. With Geulincx the causal problem was the chief one; and he denies completely the possession of any efficient causality by matter. Its changes are, so to speak, only 'cues' upon which God effects the real results. Malebranche adds to this point of view the epistemological one: not only can one substance not directly influence the other, but they are so heterogeneous that mind cannot know matter. We 'see things in God,' matter again being the occasion rather than the real object of our knowledge.

Literature: DESCARTES, Principia, § 36; Meds., v and vi, Passions de l'Âme; GEULINCX, Ethics, 113; Met., 26; MALEBRANCHE, Recherche de la Vérité, vi. 2, 3; FALCKENBERG, WINDELBAND, UEBERWEG, Histories of Philosophy (Index of each, sub verbo). (J.D.)

Occult [Lat. *occultus*, hidden]: Ger. *verborgen*; Fr. *occulte*; Ital. *occulto*. That which is hidden or secret. Cf. MAGIC.

It is applied to the assumption that insight into and control over nature is to be

obtained by mysterious and magical procedures, and by a long apprenticeship in secret lore. The physical sciences of the middle ages, alchemy and astrology, and in modern times spiritualism, theosophy, and palmistry, contain various factors of occult lore. Such doctrines, known as Occultism, fall outside the realm of modern science. See MAGIC. (J.J.)

Literature: A. E. WAITE, The Occult Sciences (1891); JASTROW, Fact and Fable in Psychology; OTTOLENGHI, Suggestione e facoltà psichiche occulte (1900). (J.J.–E.M.)

Ockham: see OCCAM.

Ockham's (or **Occam's**) **Razor**: see PARSIMONY.

Odour: see OLFACTORY SENSATION.

Oecology [Gr. *οἶκος*, a house, + *λόγος*, science, discourse]: Ger. *Oekologie*; Fr. *œcologie*; Ital. *ecologia*. The science of economics as applying to plants and animals.

The term is principally used by Haeckel, oecology not being, at least yet, a clearly recognized branch of biology. (C.S.M.)

Offence (in law) [Fr. *offense*; Lat. *offensa*]: Ger. *Verbrechen, Vergehen, Übertretung*; Fr. *crime, dêlit, contravention* (Code Pénal, art. 1–5); Ital. *delitto*. (1) A transgression of law, which is punishable as a public wrong; a crime or misdemeanour.

(2) In English law, a petty crime, not the subject of an indictment, punishable by a pecuniary forfeiture.

A criminal prosecution for an offence does not exclude a civil action by the party injured for the damages he has sustained. In France the two remedies may be joined.

In early societies not directly affecting the state, wrongs to individuals seldom found a public prosecution. When private vengeance becomes unlawful, it is replaced by a civil action for damages, or for a fixed sum by way of legal compensation. See Holland, *Jurisprudence*, chap. xvi. 322. (S.E.B.)

Ohm: see UNITS OF MEASUREMENT (electrical).

Oken, Lorenz. (1779–1851.) Educated in natural science and medicine at Würzburg and Göttingen. Professor of medicine at Jena, 1807; of natural science, 1812; resigned for political reasons, 1819; professor in Munich, 1828; in Zürich, 1832; a pupil of Schelling.

Olfactometer: see LABORATORY AND APPARATUS, III, B, (*e*).

Olfactory Nerve: see NERVOUS SYSTEM, III.

Olfactory Sensations [Lat. *olfacere*, to *smell*]: Ger. *Geruchsempfindungen*; Fr. *sensations olfactives, odorat*; Ital. *sensazioni olfattive*. The sensations aroused by adequate stimulation of the olfactory mucous membrane in the nostrils, called those of smell. The stimulus is called odour.

The number of qualities is unknown, although attempts have been made (latterly with some success) to distinguish groups or classes of smells. Smell intensities probably obey Weber's law. The human organ is very readily fatigued, but its degree of exhaustion varies with different odours. Certain smell sensations are complementary or antagonistic. Olfactory sensations are difficult of revival in idea, but this sense has a very high associative and distractive value. (E.B.T.)

Literature: modern literature begins with TOURTUAL, 1827. ZWAARDEMAKER, Physiol. d. Geruchs (1895); ARONSOHN, Du Bois-Reymond's Arch. (1886); v. VINTSCHGAU, Hermann's Handb. d. Physiol., III. ii. 225; VALENTIN, Lehrb. d. Physiol. d. Menschen, II. ii. (1848) 277; FRÖHLICH, Sitzber. d. Wien. Akad., math.-naturw. Cl., vi. (1851) 322; E. H. WEBER, Arch. f. Anat. u. Physiol. (1847), 342; J. MÜLLER, Handb. d. Physiol. d. Menschen, i. (1835) 759; SANFORD, Course in Exper. Psychol., expts. 57–60; PASSY, Année Psychol., ii. 362; art. Olfaction, in Dict. Encyc. des Sci. Méd. de Déchambre. (E.B.T.–L.M.)

Omnipotence [Lat. *omnis*, all, + *potens*, powerful]: Ger. *Allmacht*; Fr. *omnipotence*; Ital. *onnipotenza*. The attribute of God by virtue of which he is conceived to be able to realize all the possibilities presentable to his thought.

Omnipotence does not involve the ability to realize all possible conceptions, since there may be conceptions of the impossible or the self-contradictory. Nor does the omnipotence of God imply that all the conceivable possibilities are or will be realized. There may be alternative possibilities of which the choice of one will exclude the other. Nor does it imply that ethically God can contradict the moral attributes of his nature. The infinite holiness of God excludes the possibility of sin. That God should sin is not a contingency presentable to the divine thought.

Literature: see ATTRIBUTES (of God). (A.T.O.)

Omnipresence [Lat. *omnis*, all, + *praesens*, present]: Ger. *Allgegenwart*; Fr. *omniprésence*; Ital. *onnipresenza*. The attribute of God by virtue of which he is conceived to be present in the unitary wholeness of his being in every manifestation of reality.

God may be conceived as pantheistically present in every manifestation of reality; that is, as the substance of the manifestation itself. But he may also be conceived as present causally and effectually, or even in a negative and excluding sense. The nature of omnipresence is opposed to that of diffusion; God cannot be present in part. His presence in every part of the world must be whole and undivided.

Literature: see ATTRIBUTES (of God). (A.T.O.)

Omniscience [Lat. *omnis*, all, + *scire*, to know]: Ger. *Allwissenheit*; Fr. *omniscience*; Ital. *onniscienza*. The attribute of God by virtue of which his knowledge is conceived to be ideally complete and comprehensive of the whole nature of reality.

Assuming the existence of an intelligent deity, omniscience as an attribute of his nature cannot be denied. But supposing the question in debate to be that of the divine existence, then the most direct and cogent proof of the necessary existence of infinite and complete knowledge somewhere arises from the relativity and imperfection of human knowledge. St. Augustine develops this proof on the positive side, arguing from the existence of truth to the necessity of an infinite and absolute standard of truth; and recently Royce, in *The Conception of God*, develops the proof from the negative datum of the existence of error; also from the fragmentariness and incompleteness of human and finite knowledge. This necessitates the existence of an All-knower. Whether omniscience arises from the identity of God's thought with reality, or from its perfect correspondence with the real, is a debatable question in the metaphysics of religion. God's omniscience is a necessary presupposition of his foreknowledge and fore-determination.

Literature: see ATTRIBUTES (of God); ST. AUGUSTINE, Contra Academicos; ROYCE, The Conception of God. (A.T.O.)

One (the) [AS. *ān*, one; Gr. τὸ ἕν]: Ger. *das Eine, Eins und Viele* (one and many); Fr. *l'un (et le multiple)*; Ital. *l'uno (e il molteplice)*. A technical term of the Neo-Platonic philosophy denoting the absolute first principle—a principle above both Being and Thought, since these are both subject to definition and (in so far) to limitation. For the less ontological senses of the term see UNITY.

In the later oral teachings of Plato, he seems to have been much influenced by the doctrines of the Pythagoreans, and to have attempted a synthesis of their theory of numbers with his own theory of ideas. In this doctrine he identified the One with the Good, with the supreme Idea and Being (see Trendelenburg, *Platonis de Ideis et Numeris Doctrina*), and attempted to derive from it the series of other ideas. This tendency was carried still further in the Old Academy. Speusippus distinguished the One from the Good, the One being the principle of which the Good is the result; and also from reason, which is reduced to the plane of the Platonic World-soul, as moving cause (Zeller, *Philos. d. Griechen*, II. i. 851–3). In other words, the formal or logical cause was placed above both the final and the efficient. Xenocrates made the One and the Dyad the supreme ground of all existence—the One being the first or male God, the Father and Nous; while the Dyad (indefinite plurality) is the mother; from their marriage arose numbers, and the Soul is Number which is self-moving. These fantastical distinctions found a fertile soil in Neo-Pythagoreanism and Neo-Platonism, and it is in the latter that the One becomes the supreme category. With Plotinus, the Absolute is entirely ineffable and incomprehensible; and can be described only as simple relation of Being to itself, excluding all distinction and all relativity, to express which the term the One, or the Only One, is chosen. From this the whole hierarchy of subordinate beings and distinctions radiate or emanate, without either efficient or purposive activity upon its part. Jamblicus desired to make the One still more transcendent and ineffable, and accordingly distinguished between the First One and the Second One, which is interposed between it and plurality, and is the source of further emanations. Proclus carries the doctrine to its end by declaring that the Absolute, since undefinable and unknowable, cannot be called even the One except figuratively. From it, however, proceeds a plurality of Ones, which are simple and supersensuous, and through which emanation proceeds towards Being and towards Thought.

Literature: ZELLER, Philos. d. Griechen, III. ii. 491, 521, 688, 793, 846; PLOTINUS, Enneads, VI. ix. 1. (J.D.)

One (the) and **The Many**: for foreign equivalents see ONE. See the ONE, and UNITY AND PLURALITY.

Oneirology [Gr. ὄνειρος, dream, + λόγος, science]: Ger. *Oneirologie*; Fr. (1) *onirologie*, (2) *oniromancie*; Ital. *onirologia*. (1) The

science of DREAMS (q. v.) and (2) of their interpretation

Cf. SLEEP (also for literature). Oneiromancy is a better term for (2). (J.M.B.–G.F.S.)

Ontogenesis [for der. see ONTOGENY]: Ger. *Ontogenesis*; Fr. *ontogenèse*; Ital. *ontogenesi*. (1) The more restricted sphere of the ONTOGENY (q. v.) of particular organs or functions.

We speak of the ontogeny of a species, but of the ontogenesis of a specific or other character.

(2) Also used more widely for the problem of development as a whole as contrasted with the ontogeny of a particular species or group of the whole.

For the distinction between ontogenic and ontogenetic see GENETIC. (J.M.B., E.B.P.)

Ontogeny [Gr. ὤν, ὄντος, a being, + γένη, birth, development]: Ger. *ontogenetische Entwicklung*; Fr. *ontogénie* (more specialized than *ontogenèse*—Y.D.); Ital. *ontogenia*. A term employed in biology and psychology for individual development as contrasted with racial evolution or PHYLOGENY (q. v.).

Since the publication of Darwin's *Origin of Species* there has been much discussion as to the relations which the facts of ontogeny and phylogeny bear to each other. Haeckel, to whom the introduction of the terms is due, strongly supported the principle of RECAPITULATION (q. v.), that in ontogeny we have a more or less complete though abbreviated recapitulation of the phylogenetic evolution of the species. Although many observers have criticized this principle in detail, and shown that the completeness of recapitulation is never perfect, and often very imperfect, still there is, by general consent, much in ontogeny which serves to throw light on phylogeny. Cope and Hyatt have contended that by acceleration or retardation in ontogeny the order of recapitulation may have been profoundly modified and a new basis afforded for phylogenetic changes. Mehnert, following Agassiz, has urged that the rudiments (Anlagen) of stronger functional organs may appear in ontogeny earlier than those of weaker organs which preceded them in phylogeny. Weismann's conception of germinal selection suggests a means by which the order of development in ontogeny may be changed and certain stages in recapitulation omitted. A further distinction is that between DEVELOPMENT (q. v.) and growth, both included in the conception of ontogeny. Cf. EMBRYOLOGY, and ACCELERATION. (C.LL.M.)

Hyatt has formulated the principle that the directions of decay in ontogeny—in old age, &c.—anticipate structural degeneration in the phylogeny of the species in the same directions—a sort of reversed recapitulation (*Science*, Jan. 27, 1897), which with parallelism of the earlier stages in each series completes a parallel 'cycle' common to ontogeny and phylogeny (ibid., Jan. 29, 1897). (J.M.B.)

Literature: FRITZ MÜLLER, Für Darwin (1863); E. HAECKEL, Gen. Morphol.; E. D. COPE, Origin of the Fittest; ERNST MEHNERT, Biomechanik erschlossen a. d. Principe d. Organogenese; AUG. WEISMANN, Germinal Selection; MORSELLI, Antropol. generale (1887–1900); (in psychology) BALDWIN, Ment. Devel. in the Child and the Race. (C.LL.M.)

Ontological Argument: Ger. *ontologisches Argument*; Fr. *argument ontologique*; Ital. *argomento ontologico*. The method of reasoning which infers the existence of God from a consideration of the content of the idea of God; ranked by Kant with the cosmological and physico-teleological as one of the three fundamental conceptions of rational theology. See RELIGION (philosophy of).

Its best representative is Descartes, who, however, unites the psychological method of St. Augustine with the purely logical one of Anselm. See SCHOLASTICISM, I.

St. Augustine, starting with the fact of doubt, infers then to the reality of the inner subject. This self-assurance involves certainty of being, of life, of feeling, and of rational perception. The certainty of being demands that reason be ruled by a principle which is its norm, which accordingly it does not itself generate, but which is above it. The idea of perfect truth thus involves the reality of perfect truth. See PATRISTIC PHILOSOPHY (6).

Anselm, on the other hand, works upon the basis of mediaeval REALISM (q. v.). The universals are the reals; and since there are grades and degrees of universality, there are all grades of reality. The most universal, God, is the most real—*ens realissimum*. If one denies the existence of God, he must have the idea of God, and that means he has the idea of one than whom nothing greater can be thought. But to be in reality and in thought is greater than to be in intellect alone. Accordingly, if one have the thought of God at all, he must think of him as existing (Proslogium). This is often known as the 'Anselmian Argument.' Descartes argues from the existence of doubt to that of thought; and therefrom (by immediate inference) to that of the ego, and of mental pro-

cesses and ideas as bare facts at least. Such facts must have a cause; the cause must be at least equal to its effect. One has ideas of perfection, and by this principle one cannot be the cause, because one is not perfect. Only a perfect being could effect such an idea. And, again, the very idea of God, or of the infinite, involves that of necessary existence—his nature as such as to involve existence necessarily, not simply contingently, just as the idea of the triangle involves three-sidedness (*Meditations*, iii, and *Principia*, i. 14–6). In Spinoza the argument appears condensed into a definition of the Absolute—that which can be conceived only as existing. Kant attempts to show that both the cosmological and the teleological depend upon the ontological, so that if this can be shaken, all rational theology is also shaken. It is a contradiction to *think* of God as non-existent, but it does not follow that God exists. Existence is not a part of the content of thought, but rather something which controls and necessitates thought — something which is 'given.' Kant thus detects the essence of the whole rationalistic position in this argument—viz. the assumption that thought as such is a valid criterion of reality; while in truth, according to Kant, thought, *per se*, is only analytic of itself, and requires sense-experience to get a judgment of reality. Hegel, throwing overboard the ontological argument as an argument from *a* thought, the particular thought of God, holds that fundamentally Thought as such determines Being—or that at the root of all judgment is the presupposition of the identity of Thought and Being, or God; and that the old ontological argument may be regarded as a vague anticipation of this underlying unity.

Literature: see under THEISM, and RELIGION (philosophy of). (J.D.)

Ontologism [Gr. τὰ ὄντα, existing things, + λόγος, science]: Ger. *Ontologismus*; Fr. *ontologisme*; Ital. *ontologismo*. (1) The philosophical (ontological) method which proceeds from logical categories directly to reality: it is applied to the great speculative systems of which the ontological postulates are not grounded in experience.

Hume and Kant vigorously opposed ontologism. For the newer developments of the method cf. Ueberweg-Heinze, *Gesch. d. Philos.*, III. ii. (8th ed.) 328. (J.M.B.)

(2) The theory of the school founded by Gioberti in Italy (1801–52). The doctrine, namely, that the method and principles of philosophy should be sought for in the object, not in the subject.

The theory is a reaction from the supposed subjectivism of modern thought. Gioberti held that Descartes had substituted a psychologic method (see PSYCHOLOGISM) for the true ontological, and that modern philosophy, in so far as it proceeded from an examination either of consciousness or of the process of knowing, had put philosophy further off the right track, and had logically ended in sensualism, Protestantism, and atheism. We must begin with the supreme and objective intuition of the mind: *Ens creat existentias*. While the theory originally was in the interests of Catholicism, Gioberti himself gradually modified his philosophical views in a somewhat pantheistic sense, and politically became one of the chief apostles of an independent and united Italy. Ontologism was condemned by papal authority in 1861, and again in 1862 and 1866. Aside from Gioberti's political views, this result was probably inevitable, as his original system, in presupposing an adequate intuition of absolute being, tended to subordinate theology to philosophy, and, indeed, to make revealed religion unnecessary. Gioberti and his system are of interest to Americans through their influence upon O. A. Brownson. The latter, however, endeavoured to avoid the theological errors of Gioberti, and held that while his philosophy was ontological, he was not an 'ontologist' in the sense reprobated by the Church.

Literature: UEBERWEG, Hist. of Philos. (trans. by Morris, and appendix by Botta), ii. 497–509; LOUIS FERRI, L'Histoire de Philos. en Italie, i. 387; BROWNSON, Works, ii. 126, 468 ff. (art. Ontologism and Psychologism). (J.D.)

Ontology [Gr. ὄν, ὄντος, being, + λόγος, science]: Ger. *Ontologie*; Fr. *ontologie*; Ital. *ontologia*. The doctrine or science of reality in its ultimate nature. Cf. METAPHYSICS, and PHILOSOPHY.

Plato uses the phrase ὄντως ὄντα to express the absolutely real character of the ideas; but being interested chiefly in the question of method in regard to them, uses Dialectic, not ontology, to denote the science which deals with them. Even Aristotle, who held that since every special science has its own peculiar sphere of existence (οὐσία, or ὄν) as its object, there must be a supreme science which deals with existence in its generality, being as being, ὂν ᾗ ὄν, yet used the term 'first philosophy' or philosophy to designate this science. The

Scholastics, while regarding *Ens qua Ens* as the object of philosophy, yet subdivided and named it on a different basis. It was accordingly Wolff who made the term current. Philosophy is first divided into theoretical and practical; the former, called metaphysics, is again divided into a general part (ontology) dealing with being in general, irrespective of whether it is material or spiritual; and a special part dealing with the three chief forms of being, namely God, the world, and the soul (see Erdmann, ii. 223–4, and Zeller, *Gesch. d. deutsch. Philos.*, 183–8).

Wolff's identification of ontology with the logical principles of identity and contradiction had great influence (in a reactionary way) upon Kant. With Kant, ontology becomes a pretended science, since it attempts the impossible task of dealing with objects without any reference to the way in which they are given and known. Largely through his influence, ontology and ontological became terms of reproach, meaning vain attempts to deal with being apart from its presentation in consciousness (so G. H. Lewes and the English positivists generally). Sir William Hamilton defined it as the science which infers the properties of unknown being from its known manifestations—or as Inferential Psychology! (*Metaph.*, i. 124–5). The excess of emphasis upon the theory of knowing, as distinct from the theory of being, led, however, to scepticism and subjectivism, and so to a new conception of ontology as the science of the real, so far as that shall be determined through the process of knowledge: in other words, the question of the possibility of ontology is the question of the validity of knowledge.

Summing up, we may say that three stages are easily discernible. Ancient and even mediaeval philosophy are, as often said, predominatingly ontological; they are concerned with the objective, and it is assumed (naïvely or dogmatically) that being is as it is known to be, or that knowing is a process of participating in being, that it is itself a phase or factor in the structure of being. The second sense is the modern sceptical, or positivistic, in which it is assumed that being-in-itself (things as they really are) is to be sharply marked off from things in relation to us, or existence as presented through our senses, as phenomena. According to this view ontology is only the pretended and impossible theory of them. The third is the critical sense; the ancient dependence of knowing upon being is reversed; the first need is to examine the nature, possibility, and validity of knowledge, and then, through the results thus reached, go on to consider the being known. Thus ontology is no longer the general theory of being, distinct from its special forms; it is the theory of the known reality as distinct from the theory of the process of knowing. English thought probably owes to Ferrier (*Inst. of Met.*, 47–9) the clear-cut recognition of this latter distinction of ontology and epistemology. (J.D.)

Ophelimity [Gr. *ὠφέλιμος*]: Ger. *Ophelimität* (suggested—K.G.); Fr. *ophélimité*; Ital. *ofelimità*. The power of satisfying an individual want; as distinct from the more general term utility, which sometimes means the power of satisfying a real need which it is advantageous to society to meet.

The double use of the term utility has produced a certain amount of confusion (Cairnes); and Pareto has suggested this new term to represent utility as each person judges it. It is possible that this term may come into more general use.

Literature: Pareto, Cours. d'Écon. Polit. (1896). (A.T.H.)

Ophthalmia [Gr. *ὀφθαλμία*, a disease of the eyes]: Ger. *Ophthalmie*; Fr. *ophthalmie*; Ital. *oftalmia*. A term used to designate any form of inflammation of the conjunctiva. Many varieties are distinguished according to the character of the inflammation, its association with other diseases, &c. See Stephenson, *Epidemic Ophthalmia* (1897). (J.J.)

Ophthalmometry: see Eye, under Vision.

Ophthalmoscope: see Laboratory and Apparatus, III, B, (1).

Opinion [Lat. *opinio*, used to translate Gr. *δόξα*]: Ger. *Meinung*, *Meinen* (Meaning, q.v.); Fr. *avis*, *opinion*; Ital. *opinione*. Private and individual Belief (q.v.), whatever its grounds, recognized as private and individual. Cf. Knowledge (2).

The distinction between knowledge (*ἐπιστήμη*) and opinion (*δόξα*) played an important rôle in Greek philosophy. According to Plato, *δόξα* mediates between knowledge and ignorance (cf. Eisler, *Wörterb. d. philos. Begriffe*, 'Meinung' and 'Erkenntniss,' for quotations from ancient and scholastic authors).

There is a tendency to make opinion a matter of tentative and somewhat superficial belief—recognized as such by the subject himself (cf. Wundt, *Logik*, i. 370). However this may be, as to the holder of the opinion, the fact that it is individual, and

also that it is not knowledge, gave it (the Stoics, Cicero) the suggestion of uncertainty and lack of objective ground, as in the expression 'mere opinion.' The term is now too loosely used for exactness. The distinction between belief and knowledge (cognition) now furnishes terms for the older antithesis. (J.M.B.)

Opinion (in philosophy). (1) Generally speaking, any idea or conception of fact, aiming at truth and regarded as probably approximating it, but confessedly not attaining certitude as regards it. It differs from HYPOTHESIS (q. v.) in not looking forward to future verification, nor aiming to serve any function of generalization or explanation. Its reference is rather to a condition of thought based upon evidence or inference not adequate to produce assured knowledge. It connotes belief, however, rather than doubt.

(2) Used in a more depreciatory sense to denote arbitrary or dogmatic preconception, e. g. a matter of *mere* opinion of unwarranted conviction.

The term now simply denotes a certain value or function of ideas taken in their objective reference; their worth as regards a standard of truth or certainty. As a technical term it is employed to translate the Greek δόξα. Parmenides distinguished τὰ πρὸς ἀλήθειαν from τὰ πρὸς δόξαν. The former designated whatever had to do with reason, and apprehended truth and being; the latter designated mere custom and blind belief, and related to appearance, non-being, error. This sense of the term is connected with the Greek δοκεῖν, meaning both to believe or think, and to seem. This sense of mere seeming or appearance is taken up by Plato. Δόξα refers to the region intermediate between being and non-being—the realm of phenomena—and is thus intermediate between mere sense (αἴσθησις) and rational thought (διάνοια). It is subdivided into a higher form (πίστις, conviction; sometimes called right opinion, ὀρθὴ, or ἀληθὴς, δόξα) and a lower (εἰκασία, conjecture, blind guessing). The former is based on reason (it is reasonable), though unaware of its basis—not reasoned. It mediates the connection with discursive, or demonstrative, thought, and relates to those aspects of the sensible world that embody mathematical and teleological relations, which, however, cannot be stated *per se* (*Theaetetus*, 187–203; *Timaeus*, 270 ff.; and *Republic*, Bk. VI. 510). Aristotle to a considerable extent subdivides Plato's metaphysical conception into a logical and a rhetorical one. The former makes opinion a mode of judgment, hence arising in the soul as such, not from its affection by the body. As a mode of judgment, however, it does not rest upon an adequate syllogistic process, and hence does not reach demonstrative knowledge (*Anal. Post.*, Bk. I. chap. xxxiii; *Metaphysics*, vii. 15). The point of connection with Plato is in the fact that Plato related opinion to the world of change, not of being. Now, whatever changes may be otherwise than as it is, and hence it is not necessary, but contingent. On the rhetorical side, δόξα is a state of persuasion or belief, and the question of producing it is practical and psychological. Aristotle also makes much use of the conception of opinion in his ethics. All conduct relates to future, and therefore contingent, things—matters of opinion. But it is of the highest importance that these opinions should be formed in accordance with will, rather than with merely desire. Φρόνησις is the virtue of the habit of intellect in forming opinions in relation to right will. In general, δοξαστικόν, the sphere of opinion, is the probable. Plotinus makes opinion the region intermediate between imagination and reason; all knowledge of the physical world as such is opinion. It depends upon the senses, but is found only in a soul which reflects and reasons.

After the distinction between the subjective and objective was clearly established, the nature of opinion ceased to be a metaphysical problem. It simply denoted one case of the more general principle—the subjective. Consequently, in modern times, opinion hardly has a technical meaning. Hobbes uses it to denote the state of unstable and alternating ideas previous to judgment (*Leviathan*, Pt. I. chap. vii). Locke uses it in its present popular sense: the admission of something as true without assurance (*Essay*, iv. 15). Kant distinguishes matters of fact, of opinion, and of (rational) faith. The first refers to things, the existence of which can be proved either through pure reason or by exhibition in experience; the second refers to possible, but not actual, objects of experience in the world of sense, e. g. the existence of inhabitants upon Mars; the third to necessary objects of thought, but not of knowledge, i. e. God, immortality, the *summum bonum* (*Critique of Judgment*, Pt. II. § 91). (J.D.)

Opposition [Lat. *opponere*, to oppose]: Ger. *Opposition* (*Streit, Gegenwirkung*); Fr. *opposition*; Ital. *opposizione*. Used as a general term to cover all forms of antagonism and interference, and made by Tarde one of

three fundamental classes of phenomena recognized by science (*Les Lois Sociales*, 1898, Eng. trans., 1900; *Opposition Universelle*, 1896).

Cases of opposition are (see these terms) SUGGESTION (contrary), ANTITHESIS, CONTRAST, INHIBITION, CONTRADICTION, INTERFERENCE (in physics), ANTAGONISM (muscular), and, in technical senses, OPPOSITION (in logic), SOCIAL OPPOSITION, and CONSTRAINT (in social science). (J.M.B.)

Opposition (in logic). One of Aristotle's POSTPREDICAMENTS (q. v.). There are said, in the book of *Categories* (cap. x), to be four kinds of opposites. Relative opposites are relate and correlate of a disquiparant relation. Contrary opposites are the most unlike species of the same genus, as black and white, sickness and health. The third kind of opposition is between a habit and its privation, as sight and blindness. The fourth kind is between affirmation and negation. This passage has prevented the word opposite from taking any definite meaning in philosophy. (C.S.P.)

The following scheme is currently used to illustrate the forms of opposition as between the assertions of each two of the four propositions A, E, I, O (see those topics).

(J.M.B.)

Optical Axis: Ger. *Augenaxe*; Fr. *axe de l'œil*; Ital. *asse oculare*. A straight line drawn through the centre of curvature of cornea and lens, and prolonged to the posterior wall of the eye. It is the sagittal axis mentioned under CENTRE OF ROTATION (q. v.).

Literature: HELMHOLTZ, Physiol. Optik (2nd ed.), 5, 88, 108; WALLER, Human Physiol., 412. (E.B.T.)

Optical Illusions: Ger. *optische Täuschungen*; Fr. *illusions visuelles, illusions d'optique*; Ital. *illusioni visive* (or *ottiche*). (1) Broadly, any visual perception or judgment which cannot be harmonized with the deliverances of the other senses or of vision under ordinary conditions. In this sense the term includes all physical illusions (effects of mirrors, lenses, prisms, &c.), the physiological illusions attending the perception of colour (after-images, contrast, colour-induction, &c.), and the physiological and psychical illusions attending the perception of space, movement, motion, and the character of objects. (2) In a more restricted and usual sense, it includes only the last group, and of these only those occurring with sound and sane observers.

I. *Assimilative illusions.* Illusions due to the assimilation of the sensory data with an improper group of ideas, i.e. illusions resting on a false interpretation of visual data, as the mistaking of a dimly seen stump for a highwayman by a timid traveller. Illusions affecting the meaning and character of objects belong to this class.

II. *Equivocal figures.* Mostly figures capable of two or more spatial interpretations. The double interpretation is most easy when the figures are observed monocularly. Fig. 1 (the figures are numbered consecutively on the accompanying Plates I–IV[1]) may be seen in the form of a partly open book with the back or the face towards the observer; Fig. 2 as a tetrahedron, erect or leaning backward. The first three of the group of forms marked Fig. 3 show similar possibilities with still simpler lines; all can be seen as right angles in perspective, and with two spatial arrangements of one or both lines. The fourth form is a reduplication of one of the simpler ones, intended to show their relation to Zöllner's Figure (Fig. 26). Two of the equivocal figures are known by special names: Fig. 5 is *Schröder's Stair*, and Fig. 6 *Necker's Cube*. Fig. 4 allows double interpretation of a non-spatial kind; the pattern may be regarded as black on a white ground, or vice versa. Inversions of relief may also be observed in actual objects when the ordinary criteria of relief are weakened or absent. Some investigators have classed these figures with the assimilative group; others have explained their behaviour by eye-movements and other perceptive factors.

III. *Geometrical-optical illusions.* These are false perceptions, or judgments, of the geometrical relations in plane figures, except such as involve irradiation, which are usually classed by themselves. Figures exhibiting the geometrical-optical illusions are numerous, as are also the theories for their explanation. In the absence of agreement among the latter no satisfactory classification is possible. The following may serve roughly, however, for

[1] Many of these, like geometrical figures generally, are common property. The original designers have never hindered their free reproduction. In exact form many of the figures given in the plates follow Sanford, and are reproduced with the consent of Messrs. Heath & Co., Boston.

purposes of description: (1) illusions of interrupted extent; (2) illusions depending on position in the visual field; (3) illusions of contrast; (4) illusions of contours; (5) perspective illusions; (6) special and miscellaneous figures.

1. *Illusions of interrupted extent.* In Fig. 7 the dotted space at the left is equal to the open space at the right, but seems larger; in Fig. 8, however, the single interruption reverses the illusion. Figs. 10, 11, and 12 are equal squares, but 10 seems too high and 11 and 12 too broad. Fig. 12 seems a little broader than 11, possibly because the central cross-line induces the eye to traverse the figure at that point, giving the interrupting lines their maximum effect.

2. *Illusions depending on position in the field of vision.* Vertical distances or extents in the upper part of the field are apt to seem too great. Fig. 14 is a perfect square, but seems a little too high; the lower parts of S's and 8's seem disproportionately large when inverted: S S S, 8 8 8. The illusion does not, however, appreciably affect the circle in Fig. 13. Figures lying in the periphery of the field appear distorted. Fig. 9, when drawn on a large scale and viewed with motionless eye at a distance proportional to the line below the figure, appears as a checkerboard of equal or nearly equal squares.

3. *Illusions of contrast* (Figs. 15 to 18). In Fig. 15 the central circles are equal, in Fig. 16 the central angles, in Fig. 17 the two parts of the line between the squares, in Fig. 18 the middle part of the lines, but in each case the circle, angle, or line seems smaller when adjacent to large extents and larger when adjacent to small.

4. *Illusions of contour.* In Fig. 19 the unclosed semicircle seems a little flatter and of a little greater radius than the closed; in Fig. 20 the parts of the interrupted circumference seem a little flattened as though belonging to one of slightly greater radius. In Fig. 21 the middle space and the open-sided squares on either side are equal and square, but the middle space seems a little too high and narrow and the open-sided squares a little too low and broad. These figures are examples of Müller-Lyer's 'illusions of confluxion.'

5. *Perspective illusions.* In Fig. 22 the perspective suggestion of the cube makes right angles seem oblique and oblique right. In Fig. 23 the converging lines, in proportion as they suggest perspective, influence the apparent height of the parallelograms. Variants of this figure in which human forms replace the parallelograms show the illusion more effectively. In Fig. 24 the addition of the oblique lines at the end of the lower pair of parallels makes them seem further apart than the sides of the little rectangle above. When these are not added the short parallels seem further apart than the long.

6. *Special and miscellaneous figures.* Under this head are grouped a number of figures which are usually known by special names, together with a number of other figures of more or less interest. Fig. 26 is *Zöllner's Figure*—the presence of the short oblique lines distorts the actual parallelism of the long lines. Fig. 27 is *Poggendorff's Figure*—the continuation of the left oblique line is really the lower of the obliques on the right, not the upper, as appears to be the case. Fig. 28 is *Müller-Lyer's Figure*, or the 'optical paradox'—the central horizontals in the two figures are equal, but do not seem so. Of these three figures there are many variants. For example, Figs. 29 and 30, in which actual parallels are made to appear curved in opposite directions, may be regarded as variants of the Zöllner Figure; Fig. 32, in which the distance between the adjacent sides of the first and second circles is equal to the distance between the remote sides of the second and third, is a variant of the Müller-Lyer Figure; and Fig. 34, in which the right oblique if prolonged would cut the left oblique and the vertical in the same point, is a variant of the Poggendorff Figure, as is also the 'illusion of the Gothic arch,' frequently to be observed when a column is seen against a portion of an arch.

Besides these three figures there are a number of others that are sometimes referred to under the names of their originators, though the usage is not so well established. The illusion underlying Fig. 9 is known as *Recklinghausen's Illusion*; Fig. 15 is the *Figure of Ebbinghaus*; Fig. 17 is *Baldwin's Figure*; Fig. 23 is *von Bezold's Figure*; Fig. 25 is based on *Loeb's Illusion*; Fig. 29 is *Hering's Figure* (two or three other figures, variants of the Zöllner Figure, and Fig. 7 are sometimes also called by Hering's name); Fig. 30 is *Wundt's Figure*; Fig. 31 is *Münsterberg's Figure* (called also the Milton-Bradley Figure or the 'Shifted Checker-board Figure'); Fig. 33 is *Mellinghoff's Figure*; Fig. 34 is *Delbœuf's Figure*; Figs. 40 and 41 have both been called *Láska's Figure*. *Pisco's Figure*, not shown in the plate, is a variant of the Zöllner Figure.

Figs. 25, 31, 33, and 35–41 are miscel-

laneous figures that have played more or less of a rôle in the discussion of theories. In Fig. 25 the right one of the short parallels is a continuation of the single line above, but seems to be a little too far to the right; the long line at the left is supposed to lie in the median plane of the observer. Similarly, in Fig. 33 the three dots lie exactly in line with the short lines on either side of them, but seem a little too high. In Fig. 31 the central line is straight and parallel with the side lines. This figure has been regarded as a variant of the Zöllner Figure, but is really of a wholly different class, namely, of the irradiation figures. Fig. 35, showing the circle flattened at the corners of the square, was formerly regarded as an example of the 'over-estimation of small angles.' The two figures of Fig. 36 show the same effect, the horizontal line in the upper figure being bent downward very slightly at the ends, and in the lower figure bent upward. The principle of 'the over-estimation of small angles' has been found of limited application, and has been discarded as a principle of explanation. In Fig. 37 both trapezoids are of the same size, but the lower looks a little larger. In Fig. 38 the inner circle in the left figure and the outer in the right are exactly the same size; in Fig. 39 the two ring segments are equal, in Fig. 40 the two arms of the angle, but in no case does it seem so. In Fig. 41 the arms of the angle are equal, but that having the nearer dot usually seems a little longer.

Theories. The most systematic explanations are those of Lipps and Wundt. (1) Lipps sets up a principle of mechanical-aesthetic unity, in virtue of which every space form is endowed by us, in idea, with a living personality, or regarded as the scene of the interplay of mechanical forces. Our judgments of comparison are modified, unconsciously, by this anthropomorphic attitude. The circle, for example, is the result of the action of tangential and radial forces, in which the radial seems to triumph; the figure has therefore a centripetal character, which leads to underestimation: Fig. 13 looks smaller than 14, though the height and breadth of both is the same. (2) Wundt makes the illusion a matter not of deception of judgment, but of direct perception. It is conditioned by the laws of retinal image (fixation) and eye movement. Vertical distances, for example, seem greater than horizontal, because the expenditure of energy is greater in raising the eyes than in turning them through an equal angle to one side. These theories are typical of two great classes of theories: Lipps' theory of the judgment or higher process class, and Wundt's of the perceptive class. All the other proposed explanations may indeed be regarded as variants, or less perfect formulations of one or other of these. So we have the perspective theory of Hering, Guye, Thiéry; the contrast theory of Helmholtz, Heymans, Loeb; the contrast-confluxion theory of Müller-Lyer; the indistinct vision theory of Einthoven, &c.

The observation of the geometrical-optical illusions appears to begin with Oppel in 1854–5 (*Jahrb. d. Frankfurter Ver.*).

IV. *Illusions affecting the perception of distance.* Besides the geometrical-optical illusions there is an important group affecting the perception of the third dimension. Alteration of any of the ordinary criteria of distance or relief may open the way for illusions of this kind. They include the 'looming' of objects in a fog, the flattening of the dome of the sky, and the enlargement of the moon at the horizon, the alteration of relief with alteration of cross shadows, changes in inverted pictures or in the landscape when regarded with an inverted head, and many others. Here belong the illusions of the STEREOSCOPE, PSEUDOSCOPE, and TELESTEREOSCOPE (q. v.). See also ILLUSIONS OF MOTION AND MOVEMENT (visual).

Literature: optical illusions are treated in most of the standard physiologies, in many works on physics, and in the more recent textbooks of psychology. The following list has been confined for the most part to books and articles dealing exclusively with the matter in hand. For more extended references the general bibliography accompanying the 2nd ed. of HELMHOLTZ'S Physiol. Optik, and the annual lists of the Psychological Index, may be consulted. General: HOPPE, Psychologisch-physiologische Optik (Leipzig, 1881); SULLY, Illusions (N. Y., 1882); HELMHOLTZ, Physiol. Optik, 2. Aufl. (1896), especially §§ 28 and 30.

Equivocal figures: HOPPE, Beitrag zur Erklärung des Erhaben- und Vertieft-Sehens, Arch. f. d. ges. Physiol. (1887), xl. 523–32; JASTROW, The Mind's Eye, Pop. Sci. Mo. (1899), liv. 299–312; LANGE, Philos. Stud. (1888), iv. 405 ff.; LOEB, Arch. f. d. ges. Physiol. (1887), xl. 274–82; MACH, Beitr. z. Analyse d. Empfindungen (1886), 86 ff.; Sitzber. Akad. Wiss. Wien, math.-nat. Classe (1866), liv. 2. Abth., 393–408; ibid. (1868), lviii. 2. Abth., 731–6; OPPEL, Ueber ein Anaglyptoskop, Pogg. Ann. (1856), xcix. 466–9;

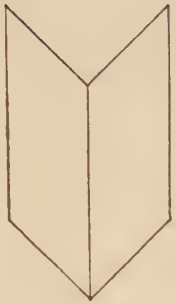


Fig. I

Fig. II

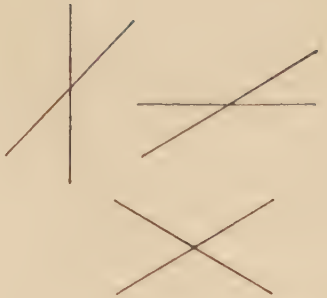


Fig. III

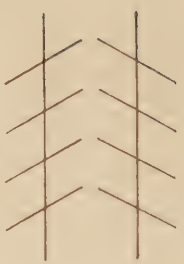


Fig. IV

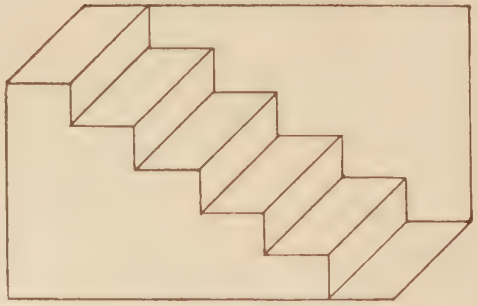


Fig. V

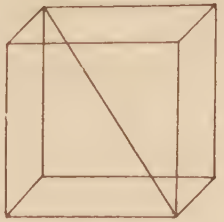


Fig. VI

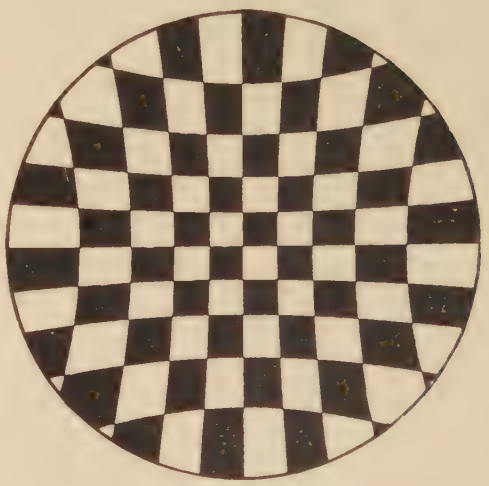


Fig. VII . . . . . .

Fig. VIII . . . .

Fig. IX

PLATE I (**Optical Illusions**).

Fig. X

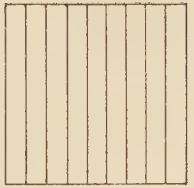


Fig. XI

Fig. XII

Fig. XIII

Fig. XIV

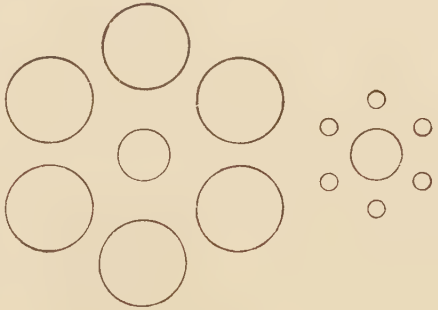


Fig. XV

Fig. XVI

Fig. XVII

Fig. XVIII

Fig. XIX

Fig. XX

Fig. XXI

PLATE II (**Optical Illusions**).

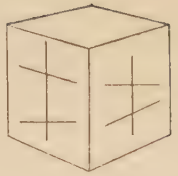


Fig. XXII

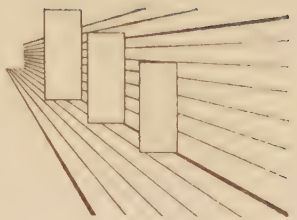


Fig. XXIII

Fig. XXIV

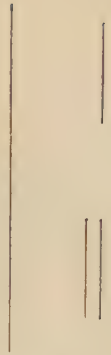


Fig. XXV

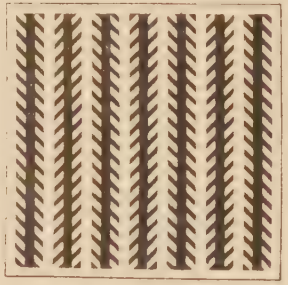


Fig. XXVI

Fig. XXVII

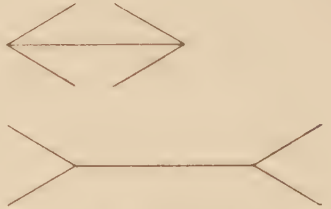


Fig. XXVIII

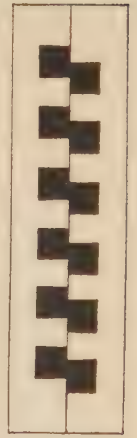


Fig. XXXI

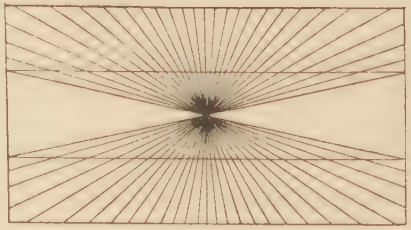


Fig. XXIX

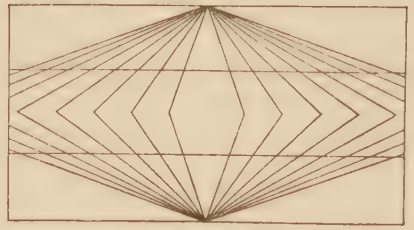


Fig. XXX

PLATE III (**Optical Illusions**).

Fig. XXXII

Fig. XXXIII

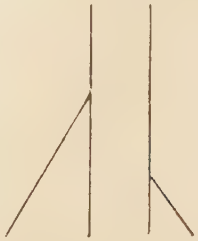


Fig. XXXIV

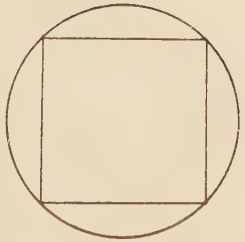


Fig. XXXV

Fig. XXXVI

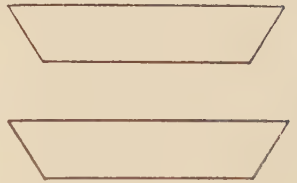


Fig. XXXVII

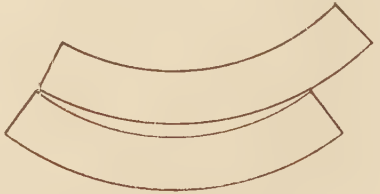


Fig. XXXIX

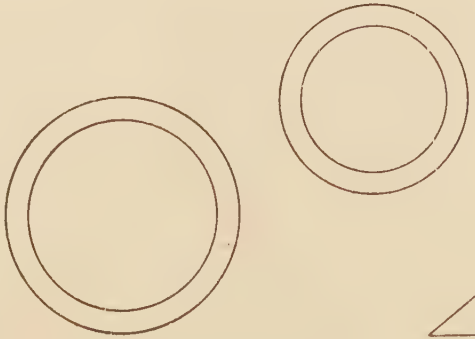


Fig. XXXVIII

Fig. XL

Fig. XLI

Fig. XLII

PLATE IV (**Optical Illusions**).

THIÉRY, work cited below under Geometrical Illusions. The original notice of Necker's Cube will be found in the Philos. Mag., Ser. 3, i. (July–December, 1832) 336–7, also Pogg. Ann. (1833), xxvii. 502–4; and of Schröder's Stair-figure, in Pogg. Ann. (1858), cv. 298–311. A number of the equivocal figures will also be found in SANFORD, Course in Exper. Psychol. (Boston, 1898), 254–60.

Geometrical-optical illusions—general and theoretical: EINTHOVEN, Arch. f. d. ges. Physiol. (1898), lxxi. 1–43; FILEHNE, Die geometrisch-optischen Täuschungen als Nachwirkungen, &c., Zeitsch. f. Psychol. (1898), xvii. 15–64; HELMHOLTZ, op. cit.; HERING, Hermann's Handb. d. Physiol., 3. Th., i. 370 ff., 536 ff., 552 ff., 564–84; Beitr. z. Physiol. (Leipzig, 1861–4), 65 ff.; LIPPS, in Helmholtz-Festgruss (Hamburg and Leipzig, 1891), 219–307 (abstract by the author, Zeitsch. f. Psychol., iii. 1892, 219–21); Raumästhetik und geometrisch-optische Täuschungen (Leipzig, 1897), vii. 424; articles in recent volumes of the Zeitsch. f. Psychol.; THIÉRY, Philos. Stud. (1895) xi. 307–70, 603–20, (1896) xii. 67–126; WITASEK, Zeitsch. f. Psychol. (1898), xix. 81–174; WUNDT, Abhandl. d. k. sächs. Gesell. d. Wiss., math.-phys. Cl. (1898), xxiv. 53–178.

On smaller groups or special figures: BALDWIN, The Effect of Size-contrast upon Judgments of Position in the Retinal Field, Psychol. Rev. (1895), ii. 244–59; see also Science, N.S. (1896), iv. 794–6; VAN BIERVLIET, Nouvelles Mesures des Illusions visuelles chez les Adultes et les Enfants, Rev. Philos. (1896), xli. 169–81; BINET, La Mesure des Illusions visuelles chez les Enfants, Rev. Philos. (1895), xl. 11–25; BRUNOT, Les Illusions d'Optique, Rev. Scient. (1893), lii. 210–12; BURMESTER, Beitrag zur experimentellen Bestimmung geometrisch-optischer Täuschungen, Zeitsch. f. Psychol. (1896), xii. 355–94; DELBŒUF, Bull. de l'Acad. Roy. de Belgique (1865), 2e sér., xix. No. 2, 195–216, and ibid. (1865), xx. No. 6, 70–97; also Une nouvelle Illusion d'Optique, Rev. Scient. (1893), li. 237–41; CHRISTINE LADD FRANKLIN, A Method for the Experimental Determination of the Horopter, Amer. J. of Psychol. (1887–8), i. 99–111; see also Science (1896), N.S., iii. 274; GUYE, l'Illusion d'Optique dans la Figure de Zöllner, Rev. Scient. (1893), li. 593–4; HEYMANS, Quantitative Untersuchungen über das 'optische Paradoxon,' Zeitsch. f. Psychol. (1895–6), ix. 221–55; Quantitative Untersuchungen über die Zöllnersche und die Loebsche Täuschung, ibid. (1897), xiv. 101–39; HÖFLER, Krümmungskontrast, Zeitsch. f. Psychol. (1896), x. 99–108; JASTROW, A Study of Zöllner's Figure and other related Illusions, Amer. J. of Psychol. (1891–2), iv. 381–98; see also abstract in Nature (1892), xlvi. 590–2, and Rev. Scient. (1892), l. 689–92; JUDD, A Study of Geometrical Illusions, Psychol. Rev. (1899), vi. 241–61; KNOX and WATANABE, On the Quantitative Determination of an Optical Illusion, Amer. J. of Psychol. (1893–5), vi. 413–21, 509–14; KUNDT, Untersuchungen über Augenmass und optische Täuschungen, Pogg. Ann. (1863), cxx. 118–58; LÁSKA, Du Bois-Reymond's Arch. (1890), 326–8; LOEB, Ueber Kontrasterscheinungen, Zeitsch. f. Psychol. (1898), xvi. 298–9; and Arch. f. d. ges. Physiol. (1895), lx. 509–18; MÜLLER-LYER, Optische Urtheilstäuschungen, Du Bois-Reymond's Arch. (1889), Suppl.-Bd., 263–70; Zeitsch. f. Psychol. (1895), ix. 1–16; and ibid. (1896), x. 421–31; MÜNSTERBERG, Die verschobene Schachbrettfigur, Zeitsch. f. Psychol. (1897), xv. 182–8; OPPEL, Jahrb. d. Frankfurter Ver., 1854–5, 37–47; 1856–7, 47–55; 1860–1, 26–37; PIERCE, The Illusions of the Kindergarten Patterns, Psychol. Rev. (1898), v. 233–53; Science (1898), viii. 814–29; ZÖLLNER, Ueber eine neue Art von Pseudoskopie, Pogg. Ann. (1860), cx. 500–23, and ibid. (1861), cxiv. 587–91. A considerable collection of these illusions will be found in Bradley's Pseudoptics (a collection of simple apparatus, arranged by MÜNSTERBERG), and in SANFORD'S Course in Exper. Psychol., 212–54.

On the apparent form of the sky and size of sun and moon: BOURDON, Les Objets paraissent-ils se rapetisser en s'élevant au-dessus de l'Horizon? Année Psychol. (1898), 55–64; FILEHNE, Die Form des Himmelsgewölbes, Arch. f. d. ges. Physiol. (1894), lix. 279–308 (contains a brief historical account of the older literature of the question); O. ZOTH, ibid. (1899), lxxviii. 363–401; see also two discussions of the subject, one in the Rev. Philos., nov. 1888 to fév. 1889, and the other in the Interméd. des Biol. (1898), 351–2 and 391–5.

On illusions of distance and relief (monocular): BREWSTER, On the Conversion of Relief by Inverted Vision, Philos. Mag., Jan.–June, 1847, Ser. 3, xxx. 432–7 (contained also in his work on the stereoscope); EINTHOVEN, On the Production of Shadow and Perspective Effects by Difference of

Colour, Brain (1893), xvi. Pts. LXI and LXII. 191–202; MARGARET F. WASHBURN, The Perception of Distance in the Inverted Landscape, Mind (1894), N.S., iii. 438–40; see also some of the papers given in the literature on equivocal figures.

On illusions of motion and movement: AUBERT, Die Bewegungsempfindung, Arch. f. d. ges. Physiol., (1886) xxxix. 347–70, (1887) xl. 459–80, 623; BOURDON, Sur les Mouvements apparents des Points lumineux, Interméd. des Biol. (1898), i. 382–4; BOWDITCH and HALL, Optical Illusions of Motion, J. of Physiol. (1880–2), iii. 297–307; FISCHER, Stroboskopische Erscheinungen, Philos. Stud. (1886), iii. 128–56; HOPPE, Die Schein-Bewegungen (Würzburg, 1879), pp. xii, 212; MAYERHAUSEN, Studies on Chromatokinopsias, Arch. of Ophthal. (1885), xiv. 81–90; SZILI, Zur Erklärung der 'Flatternden Herzen,' Du Bois-Reymond's Arch. (1891), 157–63; 'Flatternde Herzen,' Zeitsch. f. Psychol. (1891–2), iii. 359–87. Cf. also GERTZ, Skand. Arch. f. Physiol. (1899), x. 53–73, and STEWART, Amer. J. of Psychol. (1900), xi. 240–3. See also under ILLUSIONS OF MOTION AND MOVEMENT. (E.C.S.–H.C.W.)

Optic Nerve: see NERVOUS SYSTEM, III.

Optics [Gr. *τὰ ὀπτικά*, things pertaining to vision]: Ger. *Optik*; Fr. *optique*; Ital. *ottica*. (1) Psychological: the science of sight or vision.

This science includes (1) the anatomical description, gross and fine, of the total visual apparatus; (2) the dioptrics of the eye; (3) an account of the physiological functioning of the visual apparatus; (4) the doctrine of visual sensation, and (5) that of visual perception. See the various subordinate titles, and also VISION. (E.B.T.)

(2) Physical: the science of light.

It includes the phenomena of reflection, refraction, diffraction, interference, absorption, &c., of light. See Light under VISION. (C.F.H.)

(3) Pathological: the science of abnormal and defective VISION (q.v., defects of). (J.M.B.)

Literature: general works on psychological optics are: HELMHOLTZ, Physiol. Optik (1st ed., 1867; 2nd ed., 1885–96); AUBERT, Grundz. d. physiol. Optik (1876); FICK, KÜHNE, and HERING, in Hermann's Handb. d. Physiol., ii. 1 (1879); VON KRIES, Die Gesichtsempfindungen und ihre Analyse, Du Bois-Reymond's Arch. (1882); and later papers in the Zeitsch. f. Psychol., &c.; G. E. MÜLLER, Zur Psychophysik d. Gesichtsempfindungen (1897); HERING, Zur Lehre vom Lichtsinne (1878), and later papers in Arch. f. Ophthal., &c. A full bibliography, up to 1894, is given by KÖNIG in HELMHOLTZ, Physiol. Optik (2nd ed.), 1017 ff., and after 1893 in the annual Psychological Index; see the literature of VISION, and cf. also BIBLIOG. G, 2, *u*. (E.B.T.)

Optimism and **Pessimism** [Lat. *optimus*, best, superlative of *bonus*, good, and *pessimus*, worst, superlative of *malus*, bad]: Ger. *Optimismus* and *Pessimismus*; Fr. *optimisme* and *pessimisme*; Ital. *ottimismo* and *pessimismo*. These are opposite correlative terms applied to the valuation of experience, life, and the world. Optimism is the view that the world is thoroughly good; or, that it is the best possible world. Pessimism is the view that the world is thoroughly bad; or, that it is the worst possible world. The problem is that of the relation of the world as a physical, or metaphysical, existence to its interpretation in ethical terms.

Plato, in the *Timaeus*, was the first to formulate the conception of optimism. His problem is the relation of the world as created to the demiurge, its architect. He made it, although sensible and changeable, after the pattern of the eternal and ideal; 'he desired that all things should be good, and nothing bad, so far as this was attainable,' and so the world, being like the fairest and most perfect of intelligible beings, is a 'blessed god' (34), and a 'sensible god, the greatest and best, the fairest, the most perfect possible, the image of its maker' (92). None the less, as created, as sensible, the world implies non-being, and hence evil. There is a limit set; the world is to be good, 'so far as that is attainable.' And in other of his writings he dwells in a somewhat gloomy spirit upon the evils thrust into the life of man by his connection with the sensible world and the material body, so that the good is reached by withdrawal from the created world (so in *Phaedo*, *Phaedrus*, parts of *Gorgias*, and the tenth book of the *Republic*). In this conception of the element of non-being in the world of experience, limiting the eternal good, Plato is the logical father of pessimism as well as of optimism. In him the Greek spirit was so strong that upon the whole the sensuous is looked upon as the plastic embodiment of the ideal, and hence as fair and good. But the elements are in unstable equilibrium, and it needs only to have the emphasis fall upon the negative limit to have a pessimistic result. The Stoics and Neo-Platonists continued the

optimistic tradition of Plato, and so did the great Scholastics, following, however, in mode of statement, the Aristotelian teleology, rather than the Platonic tradition. The Epicurean and Sceptical schools were empirical rather than philosophical pessimists: they dwelt upon the actual bulk of pain and evil in the world, as confutation of the Stoic ethics.

Leibnitz repeats, in amplified form, a teleological optimism in his *Théodicée*. The world must be the best of all possible worlds, for it is the work of God. God through his wisdom knew all possibilities, and through his goodness chose the best of these possibilities, and through his power created it. Evil is of three forms: metaphysical, the expression of the necessary finitude of the world; physical, which serves to teach us law by punishing its infractions; and moral, which is a necessary phase of freedom. This optimism made its way through Wolff and others into the popular philosophy of the rationalistic enlightenment, and is seen, for example, in Pope. Like the optimism of the Stoics, it was met on empirical rather than philosophic grounds; notably by Voltaire's *Candide*, which, in its ironical treatment of Leibnitz, comes perilously near the doctrine that life is not worth living. In his *Phil. ignor.* Voltaire catalogues all the sources of woe in the world. Kant, in his early period, repeats the optimism of Leibnitz (*Versuch einiger Betrachtungen über den Optimismus*, 1759). In his critical period Kant holds that there is a radical evil in man's nature in his tendency to make self-love—the particularistic, sensuous principle—the motive of his actions. The good principle is that of humanity, which is rational and universal.

Rousseau had already raised the question of good and evil in the historic and social life of man, in his assertion that the primitive, natural man was thoroughly good, and was rendered thoroughly evil by institutions and culture. Kant took up this problem, in connection with his notion of the twofold structure of man just referred to; he held that in the state of nature the natural propensities are good, since adapted to their end. Physically there is 'Paradise,' morally a state of complete innocence. But man becomes conscious of himself, has a will, departs from the natural law implanted in his instincts, and evil arises—the 'Fall.' Conscious desires lead to work, to the arts, to property, to civil relations, to culture. Through culture man's life ceases to be something produced by nature, and is self-produced. The conflict of nature and culture produces unhappiness, but is an ethical necessity incident to the recognition of rational law. The end of history is not the happiness of the individual, but the perfection of the whole of humanity. Conflict and suffering lead towards the latter. In short, Kant is a pessimist regarding man in his natural actuality, an optimist regarding him in his moral possibility.

Hegel seizes upon the three factors implied in the history now resumed: (1) the relation of the negative factor in creation to the Creator (where he utilizes Fichte's idea), (2) the relation of the particular and universal in man, and (3) the function of conflict and suffering in history; and attempts to make a synthesis of pessimism and optimism. Since the absolute is not a static fact or content, but a process, it involves negation, particularization, and consequent conflict and suffering within itself. But this conflict through differentiation is the dynamic of progress, and so functions for good. In a static cross-section the world is evil; in its movement (which Hegel calls 'actuality') it is good.

The French Revolution introduced the positive side of the negative teaching of Rousseau. It held that a reform of economic and political conditions was all that was necessary to initiate a tendency towards the infinite perfectibility of man. Malthus's doctrine of population was purposely intended to refute this conception. As generalized and applied by Darwin, it has carried over the question of optimism and pessimism into the biological sphere. One school points to the universality of the struggle of existence as teaching the lesson of pessimism; another, the contribution made by this struggle to development as indicating an optimistic conclusion. Spencer has used the evolutionary conception to argue to the self-destructive, and hence transitional, character of evil.

Schopenhauer is the pessimistic pendant of Hegel's optimism. Will, not thought, or reason, is the absolute—the true thing-in-itself. This will is irrational, hence objectless; there is no progress or development, but only the restless play of purposeless will. Hence the will is essentially unhappy. Since the objective world is only a picture of this will, it must be a world of suffering. This metaphysical reasoning is reinforced by psychological considerations; desire is essen-

tially painful, and its satisfaction, pleasure, is only the removal of pain. Hence pain must preponderate in life. All experience and observation confirm this result. Von Hartmann attempts what he regards as a synthesis of Hegel and Schopenhauer. There is a logical factor and an alogical one, both attributes of the unconscious. While the will-factor makes it better that the world should not exist than exist, yet the world is the best of all possible worlds, and continually evolving to higher intensities of consciousness. Its teleology is optimistic, although from the standpoint of satisfaction the world is evil.

Current popular thought phrases the problem in the question of whether life is worth living. Interest has shifted from the theological problem to the question of intrinsic value of life. Cf. MELIORISM. (J.D.)

Literature: besides the works cited, see much of the literature of ETHICS, and of the IMMORTALITY of the soul. Also SULLY, Pessimism; JAMES, Is Life worth Living? in The Will to Believe; LUBBOCK, The Pleasures of Life; and consult BIBLIOG. F, 2, *k*. (J.M.B.)

Optotype: see TEST-TYPE.

Opzoomer, Cornelius Willem. (1821–92.) Educated in Leyden. He became professor of philosophy at Utrecht. He was an empiricist of the positive type.

Oracle [Lat. *oraculum*, from *orare*, to speak]: Ger. *Orakel*; Fr. *oracle*; Ital. *oracolo*. (1) The response of a heathen deity to a solemn petition for information or guidance in some matter of importance, ordinarily communicated through a human medium.

(2) In the Hebrew and Christian Scriptures it is used in the plural, and applied (1) to the special communications of God to or through his prophets, (2) to the whole body of inspired writings. (A.T.O.)

Order (in biology) [Lat. *ordo*, order]: Ger. *Ordnung*; Fr. *ordre*; Ital. *ordine*. In biological classification, a group of greater value than a family.

An order usually, but not necessarily, comprises several families. The use of the term is entirely conventional. See CLASSIFICATION. (C.S.M.)

Order (moral): Ger. (1), (2) *sittliche Ordnung*, (3) *Weltordnung*; Fr. *ordre moral*; Ital. *ordine morale*. (1) The system of facts and relationships to which ethical predicates are applicable; called also variously the 'world of values,' the 'universe of worths,' the 'sphere of appreciation of ideals'; in contrast with 'world of facts,' 'universe of science,' 'sphere of description of the real.' See WORTH.

(2) The establishment and maintenance of order in ethical relationships, as opposed to moral disorder; generally in reference to social rights and duties; also with reference to the divine GOVERNMENT (q.v.) of the world. Cf. THEODICY. (J.M.B.)

(3) The order of the universe conceived as making for moral ends.

The relation of the moral to the natural order of the universe is a question which belongs rather to the metaphysics of ethics, or moral philosophy, than to ethics proper, or moral science. The Stoics, following Heraclitus, identified the moral with the universal order, finding in both the expression of the common reason. The early British rationalists may be said to take fundamentally the same view, giving it, however, a theistic and less ethical construction. Kant held that the moral order is the order of the noumenal or intelligible world, which transcends the empirical or phenomenal order, and implies a moral orderer, who shall ultimately equate virtue and happiness. For Hegel the moral order is part of the cosmical order, and finds its perfect expression only in the world-state. The evolutionists either resolve the ethical into the cosmical order or make the ethical a more adequate or higher statement of the same world process which produces and includes the cosmic. Huxley, in his Romanes Lecture on *Evolution and Ethics*, insists upon the antithesis of the ethical to the cosmic process, yet accounts for the former as arising from the latter.

Literature: (3) GREEN, Prolegomena to Ethics, Bk. I; ALEXANDER, Moral Order and Progress; FRASER, Philos. of Theism; A. SETH, Man's Place in the Cosmos; HUXLEY, as cited; discussion by ROYCE, BALDWIN, WHITE, in Int. J. of Ethics (1895); general works on ethics. (J.S.–J.M.B.)

Ordinance [Lat. *ordinare*, to order or arrange]: Ger. *Verordnung*, *Vorschrift*; Fr. *ordonnance*; Ital. *ordinanza*. In religion, a religious rite or ceremony instituted by divine authority or by the enactment of some ecclesiastical body. (A.T.O.)

Ordinate: see CURVE.

Organ [Gr. ὄργανον]: Ger. *Organ*; Fr. *organe*; Ital. *organo*. A differentiated part of an ORGANISM (q.v.) partially independent anatomically and physiologically, and perform-

ing some special active function or group of functions. (C.S.M.)

Organic [Gr. *ὀργανικός*, pertaining to organs]: Ger. *organisch*; Fr. *organique*; Ital. *organico*. (1) Relating to that which has life, whether animal or vegetable; opposed to inanimate or inorganic. See ORGANISM (vital). But since the peculiarity of living beings is a certain relation of the parts to one another, such that they mutually act and react upon one another so as to maintain the whole in existence, it means (2) that which possesses a similar necessary relationship of whole and part; that which is systematized; that which is an internal or intrinsic means to an end, as distinct from an external or accidental one. This sense shades into teleological and is opposed to MECHANICAL (q. v.).

Historically, the identification of organic with the living comes last. Aristotle uses the term as equivalent to instrumental; even as synonymous with mechanical, i. e. the means that brings about a result. An organic body is one, whether living or not, in which heterogeneous elements make up a composite whole. This sense persists till Leibnitz, who uses the term in a sense easily confused with the modern significance of living, but yet not the same. According to him, that is organic all of whose parts are in turn machines, i. e. implements adapted to ends. 'Thus the organic body of a living being is a kind of divine machine or natural automaton, because a machine which is made by man's art is not a machine in all its parts; for example, the tooth of a brass wheel has parts or fragments . . . which have nothing in themselves to show the use to which the wheel was destined. . . . But nature's machines are machines even in their smallest parts *ad infinitum*' (*Monadology*, § 64; see also the *Princ. de la Nature*, 31).

From this time on, the two elements in the conception (that of composition of parts and of relation of means to end) are intimately connected, and Kant welds them together in his famous definition of the organic as that in which all the parts are reciprocally means and ends to one another and to the whole (*Werke*, iv. 493). It is this conception of the whole as primary which marks off the conception from the Leibnitzian, in which the distinction goes on *ad infinitum*. This tends to change the indefinite pluralism of Leibnitz into a systematic monism when the conception 'organic' is applied to the world at large. Cf. LIFE, ORGANISM, and SOCIAL ORGANISM.

Literature: EUCKEN, Philos. Terminol., 26, 138, 153, 202; MACKENZIE, Introd. to Social Philos. (J.D.)

Organic (in psychology). Characterizing psychological states or functions which are wholly or largely conditioned by physiological processes.

The distinction is usually between 'organic,' 'lower,' 'coarser,' &c., and 'reflective,' 'voluntary,' 'higher,' 'finer,' &c., as in the phrases organic SYMPATHY (q. v.), organic ('instinctive' or 'spontaneous') emotion (cf. BASHFULNESS, JEALOUSY, FEAR), to which are opposed the 'reflective' or, in earlier literature, 'rational' forms of the emotions, &c. 'Sensuous' and 'ideal' are terms sometimes used to cover the same distinction—which, however named, is open to much ambiguity. In most of the discussions—notably of emotion—in which the distinction is made, organic means unreflective, or, as not involving reflection, spontaneous, which last is the most appropriate word. Cf. also REFLECTIVE AND UNREFLECTIVE.

Literature: many of the discussions of REFLECTION (q. v.), passim; many of the works on EMOTION (q. v.). Special discussions with reference to 'organic' emotion are: SCHNEIDER, Mensch. Wille; BALDWIN, Ment. Devel. (chaps. on 'Emotion' and 'Sentiment' in both vols.). (J.M.B., G.F.S.)

Organic Imitation: see IMITATION, MIMETISM, and CIRCULAR REACTION.

Organic Memory: Ger. *organisches Gedächtniss*; Fr. *mémoire organique*; Ital. *memoria organica*. A term suggested by Hering for the functional reappearance of conditions once impressed upon the nervous system, after analogy with conscious memory. (J.M.B.)

Literature: HERING, Memory as a Function of Organized Matter (Eng. trans.); BUCCOLA, Mem. organica, Riv. di Filos. Scient. (1881); MORSELLI, Semej. malat. ment., ii. (1895). (J.M.B.–E.M.)

Organic (or **Indirect**) **Selection:** Ger. *organische* or *indirekte Selektion*; Fr. *sélection organique* or *indirecte*: Ital. *selezione organica* or *indiretta*. The theory that individual modifications or accommodations may supplement, protect, or screen organic characters and keep them alive until useful congenital variations arise and survive by natural selection. Cf. COINCIDENT VARIATION, and MODIFICATION. The theory of evolution which

makes general use of organic selection is called ORTHOPLASY (q.v.).

The theory, it is evident, involves two factors: (1) the survival of characters which are in any way assisted by acquired modifications, &c., during periods in which, without such assistance, they would be eliminated—until (2) the appearance and selection of congenital variations which can get along without such assistance. The second factor is simply direct natural selection; and it is the first which is the characteristic feature of this theory. By the co-operation of the acquired characters a species or race is held up against competition and destruction while variations are being accumulated which finally render the character or function complete enough to stand alone. Illustrations of this 'concurrence'—as it may be called—between acquired and congenital characters will be found in the literature cited below. The definitions which follow show differences of emphasis.

In the words of Osborn: 'Individual or acquired modifications in new circumstances are an important feature of the adult structure of every animal. Some congenital variations may coincide with such modifications, others may not. The gradual selection of those which coincide (coincident variations) may constitute an apparent inheritance of acquired modifications;' and of Lloyd Morgan (*Habit and Instinct*, 315): 'Though there is no transmission of modifications due to individual plasticity, yet these modifications afford the conditions under which variations of like nature are afforded an opportunity of occurring and of making themselves felt in race progress.' It is described by Headley as 'natural selection using Lamarckian methods' (as cited below, 120). Groos, in expounding organic selection, speaks of the effects of imitation as 'keeping a species afloat until natural selection can substitute the life-boat heredity for the life-preserver tradition' (work cited below, 283).

The relation of organic to natural selection is also involved in the question of the nature and origin of the PLASTICITY (q.v.) which organic selection requires. The different views are (1) that this plasticity is itself entirely due to natural selection (Poulton); (2) that it is an original property of organic matter (Osborn); (3) that there are two forms of plasticity, as indicated under that topic (Morgan, Baldwin), that of which organic selection makes use, however, being largely the product of natural selection.

This general way of looking at certain cases of survival in the struggle for existence was independently arrived at by Ll. Morgan, H. F. Osborn, and J. Mark Baldwin, and the term 'organic selection' was proposed by the last named on two grounds: (1) because the organism, by effecting accommodations, screens its characters, and so gives them a chance of being kept alive; and (2) because the organism thus, so to speak, selects itself; that is, it is its own accommodations which are instrumental in securing its survival. It is the *behaviour of the organism*, therefore, which is important, and not variations alone, as in simple natural selection generally—and hence the adjective 'organic.' It is in so far the *organic* functions—reactions, struggles, efforts, conscious choices, &c.—which really count and determine what sort of characters shall be saved by natural selection.

The term 'indirect selection,' which some prefer (Poulton, Morgan), has reference to the way in which natural selection comes into operation in these cases, i. e. indirectly through the saving presence of modifications, and not directly upon useful variations. This term was suggested by an anonymous writer in the *Zoological Record*. Poulton also used the term indirect in its adjective form in the following (see reference below): 'These authorities justly claim that the power of the individual to play a certain part in the struggle for life may constantly give a definite trend and direction to evolution; and although the results of purely individual response to external forces are not hereditary, yet indirectly they may result in the permanent addition of corresponding powers to the species. The principles involved seem to constitute a substantial gain in the attempt to understand the motive forces by which the great process of organic evolution has been brought about.'

The effectiveness of the method of screening and so accumulating certain variations in producing well-marked types is seen in ARTIFICIAL SELECTION (q.v.), where certain creatures are set apart for breeding. But any influence, such as the individual's own accommodation to his environment, which is important enough to keep him and his like alive, while others go under in the struggle for existence, may be considered with reason a real cause in producing just such effects. Thus by the processes of accommodation, a weapon analogous to artificial selection is put into the hands of the organism itself, and the species profits by it. Headley characterizes

this aspect of the case as follows: 'The creatures pilot themselves. . . . Selection ceases to be purely natural: it is in part artificial' (as cited below, 128; see also Baldwin, *Amer. Naturalist.*, as cited below). Cf. the view of J. Ward called SUBJECTIVE SELECTION (q. v.).

This point of view has had especial application and development in connection with DETERMINATE EVOLUTION (q. v.), which, when organic selection is operative through a series of generations, becomes what is called ORTHOPLASY (q. v.); with the rise of INSTINCT (q. v.); with the origin of structures lacking in apparent utility when full-formed or when only partly formed (cf. EVOLUTION); with correlated variations, co-ordinated muscular groups, &c. (see CORRELATION, in biology, and INTRA-SELECTION); with MENTAL EVOLUTION (q. v.), and SOCIAL EVOLUTION (q. v.).

That this form of selection is a real factor in evolution, either as taken with natural selection or as a form of original 'self-development,' replacing natural selection (Osborn, citation below), is now widely admitted: among biologists, by Osborn, Wallace, Poulton, Thomson, Whitman, Defrance, Davenport, Conn, Headley, and others; among psychologists, by Morgan, James, Stout, Ward, Groos, Baldwin, and others. It is held, by many of those who accept it, to answer certain forcible objections to the universal application of natural selection in its 'direct' form, and so to render the resort to the hypothesis of the 'inheritance of acquired characters'—in the absence of positive evidence for it—unnecessary (cf. HEREDITY). It would seem to be a legitimate resource in the following more special cases.

(1) In cases in which there is possible correlation or association between the organ or function whose origin is in question, and another which is of acknowledged utility: the latter serves as screen to the undeveloped stages of the former.

(2) In cases of CONVERGENCE (q. v.) of lines of descent: certain accommodations, common to the two lines which converge, compel the indirect selection of variations which not only coincide with the individual modifications, but also coincide more and more closely with each other; so in many cases of resemblance due to similarity of function (cf. MIMICRY, 1) and of resemblance in habit and attitude (cf. MIMICRY, 4).

(3) In cases of divergent or POLYTYPIC EVOLUTION (q. v.): two or more lines of variation, being equally available as supports to an essential accommodation or as co-operating factors in it, are therefore both preserved, although they carry, when developed, each its own structural form. There are many cases in the animal world of ANALOGOUS ORGANS (q. v.) which are yet not HOMOLOGOUS (q. v.)—organs of divergent origin but of common function, and possibly of common appearance—the rudiments of which may have owed their common and indirect selection to a single more general utility.

Or, again, two or more different accommodations may subserve the same utility, and thus conserve different lines of variation. To escape floods, for example, some individuals of a species may learn to climb trees, while others learn to swim. This has been recognized in Gulick's *Change of Habits* as a cause of segregation (cf. ISOLATION) and thus of divergent evolution.

(4) In cases of apparent permanent influence, upon a stock, of temporary changes of environment, such as transplantation: the direction of variation seems to be changed by the temporary environment, when there is really only the temporary indirect selection of variations appropriate to the changed environment. For example, it is possible that plants undergo quick changes by indirect selection when transplanted, the effects of this selection of variations continuing a longer or shorter period after return to the original conditions of life, especially when the original environment does not demand their prompt weeding out. This is one of the cases most often cited as favouring the hypothesis of Lamarckian inheritance. (Osborn, however, thinks there is not enough time in these cases for the operation of organic selection.)

(5) In all cases of conscious or intelligent, including social, accommodation. In these cases conscious action directly reinforces and supplements congenital endowment at the same time that there is indirect selection of the variations which intelligence finds most suited to its needs. Thus congenital tendencies and predispositions are fostered. The influence of orthoplastic family life is well illustrated by Headley (as cited below). This is seen also in the rise of many instincts, for the performance of which intelligent direction has gradually become unnecessary; see the use of the principle in an independent way by P. Marchal (*Rev. Scient.*, Nov. 21, 1896, 653), to explain the origin of the queen bee. See INSTINCT.

Indirect selection applies also to the origin

of the forms of emotional expression (e. g. Darwin's classical case of the inherited fear of man by certain birds in the Oceanic Islands: cf. Darwin, *Descent of Man*, chap. ii) which are thought to have been useful and, in most cases, intelligent accommodations to an environment consisting of other animals. In man also we find reactions, e. g. of bashfulness, shame, &c., largely organic, whose origin it is difficult to explain in any other way, unless we admit the inheritance of acquired characters. It is also recognized that social action by animals (e. g. the more or less intelligent herding) was often of direct utility and caused their survival until the corresponding instincts became fixed.

It also works another way, as Groos shows: an instinct is broken up and so yields to the intelligent performance of the same function, by variation towards the increased plasticity and 'educability' which intelligent action requires. In this way another objection to Darwinism is met—that which cites the difficulty of securing the modification and decay of instincts by natural selection alone.

(6) In this connection it has also been pointed out that with the rise of intelligence, broadly understood, there comes into existence an animal TRADITION (q. v.)—treated also in the literature under the names 'social heredity,' 'imitation,' &c.—into which the young are educated in each succeeding generation. This sets the direction of most useful attainment, and constitutes a new and higher environment. It is with reference to this, in many cases at least, that instincts both rise and decay: decay, when plasticity and continued relearning by each generation are demanded; rise, when fixed organic reactions stereotyped by variation are of most use. So there is constant adjustment, as the conditions of life may demand, between the intelligent actions embodied in tradition, and the instinctive actions embodied, through natural selection, in inherited structure; and this is the essential co-operation of the two factors, accommodation and variation, as postulated by the theory of organic selection. The line of acquired accommodations takes the lead—variations follow. This is very different from the view which relies exclusively upon the natural selection of useful variations in this or that character; for it introduces a conserving and regulating factor—a 'blanket utility,' so to speak—under which various minor adaptations may be adjusted in the organism as a whole. Of course, the selection of the plasticity, required by intelligence and educability, is by direct natural selection; but, inside of this, the relation of the intelligence to the specific organic characters and functions is the one of 'concurrence' which organic selection postulates.

(7) It is a factor of stability and persistence of type as opposed, e. g., to the fatal result of disadvantageous variations (Wallace); since the individual accommodations may compensate in a constantly increasing way for the loss of direct utility of the character in question. This is notably the case with intelligent accommodations. These piece-out obstructed, distorted, or partial instincts or other functions, and modify the environment to secure their free play or to negative their disadvantageous results. This carries further the advantage which Weismann (*Romanes Lecture*) has claimed for INTRASELECTION (q. v., and see below).

(8) It secures the effectiveness of variation in certain lines, not only by keeping alive these variations from generation to generation, but also by increasing the number of individuals having these variations in common, until they become established in the species. It thus answers the stock objection to natural selection (cf. e. g. Henslow, *Natural Science*, vi, 1895, 585 ff., and viii, 1897, 169 ff.) which claims that the same variation would not occur at any one time in a sufficient number of individuals to establish itself, except in cases of great environmental change or of migration (cf. MUTATION). Organic selection shifts the mean of a character, and this changed mean is what natural selection requires (cf. Baldwin, *Amer. Natural.*, as cited below, and Conn, *The Method of Evolution*, 75 f.).

(9) It is a segregating or isolating factor, as is illustrated under (3) above. Animals which make common accommodations survive and mate together. In the presence of an enemy, those animals of a group which can run fast escape together; those which can go through small holes remain likewise together; and so do those hardy enough to fight.

As to the possible universal application of organic selection, it would seem to depend upon whether there are any cases of congenital characters maturing without some individual accommodation due to the action of the life conditions upon their plastic material. Certain recent writers (Driesch, Delage, Ortmann) deny that any characters are entirely congenital, or 'congenital' at all in the current sense of the term which contrasts them with

'acquired' characters (cf. ACQUIRED AND CONGENITAL CHARACTERS). It would follow that in all cases those variations in which the most fortunate combination of innate and acquired elements is secured would survive under natural selection; and this would mean that organic selection is universal. In the words of Groos (*Play of Man*, Eng. trans., 373), 'organic selection may possibly be applied to all cases of adaptation (Anpassung)'; the question remains, therefore, in determining the scope of the principle, whether there are any characters which are not in some measure acquired in the individual's development.

This point of view follows naturally from the position taken by the school of so-called organicists (see Delage, *Structure du Protoplasma*, &c., 720), who insist in various ways upon the part played by the organism itself in evolution. The writers of this school, however, either hold to Lamarckian inheritance (Eimer), to a form of self-development (Driesch; called 'auto-régulation' and 'auto-détermination' by Delage), or to INTRA-SELECTION considered as repeating its results anew in each generation (Roux, Delage). In the exposition of this last view, Delage used the term 'sélection organique' for intra-selection (loc. cit., 725, 732); and Weismann (*Romanes Lecture*) combines intraselection, which 'effects the special adaptation of the tissues . . . *in each individual*' ('for *in each individual* the necessary adaptation will be temporarily accomplished by intraselection'), with his hypothesis of GERMINAL SELECTION (q.v.). 'As the primary variations,' says Weismann, 'in the phyletic metamorphosis occurred little by little, the secondary adaptations would probably, as a rule, be able to keep pace with them. Time would thus be gained till, in the course of generations, by constant selection of *those germs the primary constituents of which are best fitted to one another*, . . . a definite metamorphosis of the species involving all the parts of the organism may occur.' In this passage (which has been quoted by Osborn and others to show that Weismann anticipated the principle of organic selection) Weismann recognizes the essential co-operation of variation and modification which organic selection postulates, but he reverses the order of these factors by making germinal variations (in the words italicized above by the present writer) the leading agency in the determination of the course of evolution, while individual accommodation and modification 'probably keep pace with them' (the primary variations). The writers mentioned above, however, who originally expounded organic selection, rely upon 'coincident' variation to 'keep pace,' under the action of natural selection, with individual accommodation; which last thus takes the lead and marks out the course of evolution. The hypothesis of germinal selection, which is essential to Weismann's view, is not at all involved in theirs. In the words of Lloyd Morgan, who indicates substantially the relation between Weismann's views and his own as that given above: 'Natural selection would work along the lines laid down for it by adaptive modifications. Modification would lead; variation follow in its wake. Weismann's germinal selection, if a *vera causa*, would be a co-operating factor and assist in producing the requisite variations' (*Habit and Instinct*, 318). Defrance says on the same point (*Année Biol.*, iii, 1899, 533): 'He (Weismann) has made use of his personal hypotheses on germ-plasm which are not universally admitted, while the conception of Ll. Morgan and Baldwin avoids this stumbling-block by not closing inquiry into the processes which enter into play. It is true that this leaves it an hypothesis; but it is nevertheless true that it offers an intelligible solution of one of those problems which appear on the surface to constitute the most insoluble of enigmas.' Osborn brings into play the further factor of 'determinate variation,' which if true would be analogous in its rôle to Weismann's germinal selection (see Osborn, *On the Limits of Organic Selection*, as below). He also holds that 'there is an unknown factor in evolution yet to be discovered.'

Literature: LL. MORGAN, Science, Nov. 27, 1896, and Habit and Instinct (1896); OSBORN, Science, Apr. 3, 1896, and Nov. 27, 1896; and On the Limits of Organic Selection, Science, Oct. 15, 1897; BALDWIN, Ment. Devel. in the Child and the Race (1st ed., 1895, where the term organic selection was first used; much developed in the Fr. and Ger. trans.); Science, Mar. 20, 1896; and Amer. Natural., June and July, 1896; BALDWIN (in collaboration with MORGAN and OSBORN), on the terminology of the subject, in Nature, lv. (1897) 558, and Science, Apr. 25, 1897 (trans. in Biol. Centralbl., June 1, 1897, and in Rev. Scient., June, 1897); POULTON, Science, Oct. 15, 1897; WALLACE (review of Morgan), Natural Sci., x. 161; GROOS, The Play of Man, 372 f., 376, 283, 395 (Eng. trans.); WHITMAN, Woods Holl Biol. Lectures, 1898

(1899); THOMSON, The Study of Animal Life (1900); expositions and criticisms are to be found (Index, sub verbo) in the Année Biol. (literature for 1896 ff.). Late works in which the principle is adopted are LL. MORGAN, Animal Behaviour (1900); CONN, The Method of Evolution (1901); HEADLEY, The Problems of Evolution (1901; gives interesting cases from nature). Cf. also GULICK, in Nature, Apr. 1, 1897; and see the recent literature of INSTINCT.

(J.M.B., C.LL.M., E.B.P., G.F.S., K.G.)

Organic Sensation: Ger. *Organempfindung*; Fr. *sensation interne*; Ital. *sensazione organica* (or *diffusa*). A sensation whose adequate stimulus is a change in the state of a bodily organ, i.e. a physiological (as contradistinguished from a physical) process.

The organic sensations fall, so far as they are known, into the following groups:—

(1) MUSCULAR SENSATION (q.v.): sensations from muscle, tendon, joint.

(2) Alimentary sensations: hunger, thirst, nausea.

(3) Sexual sensation: a single, unnamed quality.

(4) STATIC SENSATION (q.v.): dizziness. To these may perhaps be added the following:—

(5) Respiratory sensations (distinct qualities doubtful).

(6) Circulatory sensations: 'pins and needles,' itching (possibly), tingling, &c., arising from conditions of the blood-circulation, which may contain a specific quality.

The organic sensations are psychologically important (*a*) for the theory of feeling and emotion (James-Lange theory), and (*b*) for the theory of recognition and memory (Külpe's recognitive mood, Ribot's affective memory, &c.). Cf. COMMON SENSATION. It may be noted that the obscurity of the organic qualities is the reason for, and partial justification of, a 'functional' classification of SENSATION (q.v.).

Literature: MACH, Bewegungsempfindungen (1875); RICHET, Recherches expér. et clin. sur la sensibilité (1877); KRÖNER, Körperliches Gefühl (1887); KÜLPE, Outlines of Psychol., 140; WUNDT, Physiol. Psychol. (4th ed.), i. 284; HAMILTON, Lects. on Met., ii. 154 ff.; BEAUNIS, Les sensations internes; TH. RIBOT, Maladies de la personnalité (1888); Psychol. des sentiments (1896). (E.B.T.)

Organism [Gr. ὄργανον, an organ]: Ger. *Organismus*; Fr. *organisme*; Ital. *organismo*. (1) A living being: see the following topic.

(2) A totality whose various parts or elements are related to each other according to some principle which is derived from the whole itself, and hence is internal and not external, necessary and not accidental. A system. Cf. ORGANIC.

While the Greeks use the term in quite another sense from the moderns, the idea, even in its generalized philosophical use, was quite familiar to them. Plato regarded the world as an animated whole—as ζῶον. With Aristotle the end or form animates all potentiality or matter in such a way as to keep it moving towards perfection, and thereby gives it order. In living beings, this appears in the continual higher stages of articulation (διάρθρωσις). Thus the form is the inner life of nature, as distinct from an external arrangement. In this sense, Aristotle applies the notion (not the term) organism, or a whole ordered and moving from an internal principle of causality, to the state, since the individual gets his social life only through his immanent connection with the whole. The Stoics expressly declare the world to be σύστημα, a living organized whole; and ethically they proclaim that the individual is not a part (μέρος), but a member (μέλος) of the universe. The conception on the social side passed into Christianity in the conception of the Church as the mystic body (*corpus mysticum*) of Christ. In the middle ages, the paralleling of the state and the living body is common, and John of Salisbury undertakes to find a part of the body corresponding to every part of the state (see Eucken, *Grundbegriffe d. Gegenwart*, 157). Herder, in the 18th century, is most active in reviving a conception of nature as a living whole, working according to an internal principle, through a continuous series of manifestations. Kant gives the conception a clear-cut definition (see ORGANIC), but gives the idea only a subjective validity. Schelling, however, gives the term a completely objective meaning, applicable to the universe itself. Through his followers it becomes a favourite term to designate the principle of philosophies which regard the world as moving from intrinsic principles, and as producing its effects after the manner of an immanent life and intelligence (*Syst. d. trans. Idealismus*, 261).

Spencer has recently used the term in a generalized sense in recent English thought, as in his assertion that society is an organism. On discussions of this point, however, there is ambiguity—organism is sometimes used as analogous to the organs (or functions) of an

animal body; at other times, in its logical sense, of a coherent whole, systematized by an internal principle. Cf. Social Organism.

Literature: see Organic, and Social Organism. (J.D.)

Organism (in biology). A discrete body, of which the essential constituent is living protoplasm. The term originally indicated the recognition of organization as essential to life, and as opposite to unorganized or dead matter. Cf. Life, and Living Matter. (C.S.M.)

Organization: Ger. *Organisation*; Fr. *organisation*; Ital. *organizzazione*. A more or less systematic arrangement of relatively separate parts in a whole suited to fulfil any sort of function.

The term has applications, with varying degrees of definiteness, in the phrases 'mental organization' (in which the systematic determination of the flow of the mental life is characterized), Social Organization (q. v.), 'organization of knowledge' (the adjustment, in a philosophical view, of the details of knowledge as contributed by the different sciences).

The shading of meaning which distinguishes organization from Organism (q.v.) is in the direction of relative looseness of relation as between the parts and the whole, and relative lack of independence of conditions external to the system. An organization is 'formed,' 'controlled,' 'modified,' 'worked,' &c.; to an organism these predicates are not applicable. Moreover, we do not speak of the 'organs' of an organization, but of its 'members'; each being at once less dependent upon the whole, and less necessary to it. Hence the preference for 'mental organization'; it leaves open the question whether mind has the inherent principle of its own systematic process which is necessary to an organism.

In the adjective organic this difference disappears, and much ambiguity arises therefrom. The term 'organized' is preferable to characterize an organization, organic being limited in its application to organisms proper. (J.M.B.)

Organization (industrial): Ger. *Unternehmungsform*; Fr. *organisation industrielle*; Ital. *ordinamento industriale*. The immaterial advantages for production which have attended the growth of capital.

Reckoned by Walker and Marshall as an agent or factor in production, co-ordinate with land, labour, and capital. (A.T.H.)

Organon [Gr.]: the same in the other languages. Since neither the Aristotelian definition of a speculative science, nor of a practical science, nor of an art, seemed to suit logic very well, the early peripatetics and commentators denied that it was either a science or an art, and called it an instrument, ὄργανον; but they did not precisely define their meaning. It was negative chiefly. The collection of Aristotle's logical treatises, when it was made, thus came to be called the Organon.

Francis Bacon, disapproving of Aristotle's methods, wished all that to be laid aside; and he consequently called his work, which was designed to be a guide for establishing a systematic inductive procedure, *Novum Organum*. The name was afterwards imitated by sundry authors, as Lambert in his *Neues Organon*, and Whewell in his *Novum Organum Renovatum*. (C.S.P.)

Oriental Philosophy (and **Religion**). The group of religions treated in the following article includes those of Egypt, Babylonio-Assyria, Persia, India, China (in geographical enumeration from west to east).

Among these nations India alone can be said to have produced schools of philosophy analogous to those of Greece, though the ethical teachers of China have good claims to rank with the thinkers of Europe. In the religions of Egypt, Babylonio-Assyria, and Persia, the philosophical element does not reach self-conscious expression, it remains entangled in mythology. But all religions really involve a primitive philosophy. They attempt to give some kind of rational explanation of the world of objects and of life by which they are confronted. This is obviously the case even in the animistic stage, and it is no less so with the more elaborate systems which have emerged out of that rank, and acquired more or less consistency of higher thought. Only this aspect is here sketched. Questions of ritual and hierarchical organization are only touched where they involve the form and significance of belief[1].

I. **Egypt.** The wisdom of Egypt was famous in ancient Israel, and the Greeks again and again expressed their indebtedness to it. Thales, Pythagoras, and Plato were said to have studied there. Aristotle regarded it as the home of mathematical lore. The author of the treatise on 'Isis and Osiris,' reckoned among the works of Plutarch, indicates the interest which the eclectic philosophers of the Roman Empire still felt in its venerable symbols.

[1] In the spelling of proper names and technical terms, the diacritical marks usually employed by scholars are here abandoned, and foreign words are represented in the English alphabet.

Since Young and Champollion discovered the clue to the hieroglyphics, an immense wealth of material has been derived from the inscriptions of temple and tomb; yet the problem of the real character of ancient Egyptian religion remains exceedingly obscure. Putting aside the difficult questions of the origins of the Egyptian race and culture, it may be said that the earliest texts present already the chief forms of its pantheon. Even at the outset it exhibits a quasi-monotheism (for explanations of this phenomenon see below). In spite of the conservatism of its priesthoods, its history shows occasional vicissitudes, as one centre after another acquires prominence or sinks into decline. Some features in the cultus, such as the numerous forms of animal worship, the prodigious number of gods of particular functions (e.g. child-birth, child-naming, child-nurture, the ripening of the corn, &c.), and the constant use of magic, connect Egyptian religion with Animism. Of a higher order are the elemental gods, the earth and sky, the sun and stars, the Nile. On this side, the number of the gods was perpetually being increased by the amalgamation of local cults, and the occasional incorporation of foreign deities, for polytheism can always tolerantly accommodate new comers. In this view contradictions and inconsistencies may be explained as due to prior diversities of race (Petrie). On the other hand, from the earliest times, another tendency towards henotheism, or even monotheism, may be traced with equal clearness. The chief question for philosophy concerns the value of this tendency; and different answers are given by different investigators.

The word 'god' occurs both in the sing. *neter* (or *nuter*), and in the pl. *neteru* (or *nuteru*). De Rougé and Pierret associated it with the idea of continuous renewal, so that God is 'the imperishable' (Tiele); Renouf finds in it the notion of power; Brugsch unites both, affirming it to mean 'the active energy which produces and creates in regular recurrence, imparts new life to things, and restores their youthful vigour.' But Maspero believes the word to be so old that its original sense cannot be determined, Renouf's meaning 'the mighty' being derived and not original (if it ever existed). The early phrases in which the singular occurs are such as these: 'Thou existest at the side of God,' 'He weigheth words, and behold God hearkeneth unto the words,' 'Not known are the things which God will do,' 'What is loved of God is obedience, disobedience God hateth' (cf. others still more striking, given without date, Brugsch, *Mythologie*, 96–9). But against these may be set other phrases in which one deity after another is called 'The one and only God'; such is Tumu at Heliopolis, or Anhûri-Shû at Thinis. The clue to this latter conception is to be found in the local cults prevailing in different territorial divisions. Different cycles of myth gathered round them, and one or another rose into solitary pre-eminence before the eyes of his worshippers, like Ptah at Memphis, Ra at Heliopolis, &c. Sometimes several divine forms were united, as though to express the unifying tendency. At Heliopolis, Ra (the sun-god) was viewed theologically as Tumu, and Tumu was placed at the head of the great cosmogonic scheme which conceived the universe as produced with the help of four pairs of gods and goddesses mysteriously derived from him. Tum-Ra was thus 'the only god,' who had created himself and formed his own name, who could say, 'I am yesterday, I know to-morrow' (*Book of the Dead*, xvii). This arrangement was known as an 'Ennead' (*paūīt nūtīrū*), and was widely copied elsewhere. Even tendencies towards monotheism thus had always a background of mythology. Once only was it attempted to make the state-religion monotheistic, when (about 1450 B.C.) Khu-en-Aten (Amenophis IV) endeavoured to establish the exclusive worship of the solar disk Aten-Ra as the supreme symbol of deity, and even tried to eliminate from the inscriptions the names of his rivals (see the splendid hymn translated by Wiedemann, *Religion of the Ancient Egyptians*, 1897, 40). But this effort to select one of the old nature-gods for a kind of transfiguration was soon undone. The brilliant triumphs of the Theban monarchy gave prominence to the majestic form of Amun-Ra, round whom gather some of the noblest of the quasi-monotheistic hymns. Yet he, too, passed, though he could still serve in the time of Darius as the centre of unity. In a hymn of this date on the temple of El-Kargeh in the great oasis he is identified with heaven and earth, with fire, water, and air. He is the giver of life and increaser of all things. Shu, Tefnu, Mut, and Khons are his forms: 'each god has assumed thy skin.' Well may Birch, in translating the hymn (*Trans. Soc. Bibl. Archaeol.*, v. 1877, 294), declare it to be 'the nearest approach to the monotheism of one deity manifested by

different types in the chief cities of Egypt.'

The cosmogonic speculations chiefly rest on the belief introduced to the Greeks by Thales that the beginning of all things lay in the primaeval waters (Nu or Nun). One set of myths represents earth and sky lying like lovers within them. The story of their separation and the elevation of the sky belongs to the same class of savage tales as that of the New Zealand Rangi and Papa. Another group gathers round the widespread conception of the world-egg. Various gods, such as Ptah the 'former,' Khnum the 'moulder,' are invested in different cycles with creative functions. A further set of myths embodies the ideas of the conflict of the powers of light and darkness, first physical and then moral. The order of nature was mythologically concentrated in two figures, Thoth and Maāt. Thoth was originally a moon-god, and hence came to be god of time. He is son of Ra (the sun-god), but also 'the unborn,' 'the one God,' 'the alone only One,' who creates by the word, or rather simply by voice. He is the founder of the sciences connected with space and time (e.g. astronomy and land measurement); he is also the god of letters and revelation, and the guardian of law. Maāt (from *mā*, to stretch out) embodies the ideas of right, truth, justice, order. She is the daughter of Ra, sister and consort of Thoth, 'lady of heaven,' 'queen of the earth,' so that the universe is under her control. The gods are said to exist by, or upon, her. She is even 'queen of all the gods and goddesses,' so that order is more than 'heaven's first law,' it is itself the very sovereign of the world. This idea must be combined with that of perpetual renewal, of everlasting continuity through incessant change, which seems the philosophical essence of Egyptian religion. 'I am that which was, which is, and which will be,' ran the inscription in the name of the great goddess of Sais, according to the *De Iside*, 9, 'and my veil no mortal yet hath lifted.'

Egyptian psychology is of course at a crude stage. The doctrine of man and his nature is chiefly comprised in the texts dealing with the dead, especially the so-called *Book of the Dead*, a collection of chapters of various ages, some embodying extremely ancient ideas, intended to guard the deceased on his journey through the perils of the next world. The various elements of a human being are enumerated by Budge (*Papyrus of Ani*, 1895, pp. lviii–lxix) thus: (1) The physical body, *khat*. (2) The spiritual body, *sāḥu*: this can ascend into heaven and dwell with the gods. (3) The heart, *ab*, seat of life, and centre of good and evil thoughts. (4) The double, the genius or εἴδωλον, the *ka*: this received the funeral offerings and dwelt in the statue of the deceased in the tomb, as the *ka* of a god inhabited the statue of the god. Petrie identifies it further with 'the inner mental consciousness and powers of thought.' (5) The soul or *ba*, represented as a human-headed hawk, which could revisit the body and consume the funeral-meats, but also dwelt in heaven and shared the life of the gods. (6) The shadow or shade, *khaibit*, which again was free to move about. (7) The *khu*, 'shining' or translucent, sometimes identified with 'intelligence,' or otherwise interpreted as 'spirit': this also, like the shadow and the *ka*, belonged to gods as well as men. (8) The *sekhem*, enumerated with the *ka* and the *ba*, placed among the *khu's*, sometimes rendered 'power,' sometimes 'form.' (9) The name, *ren*, also believed to exist in heaven. The conception of the destinies of the dead seems to have been largely moulded on the analogy of the journey of the sun through the hours of the night, along the valley of another Nile, whether in an underworld or a world alongside of this to the north. The identification of the deceased with Osiris (whose myth was united with that of Ra) takes place at an early period, first in the person of the king, and then for all. And the whole process receives a remarkable ethical development under the Theban monarchy of the 'New Empire,' when the famous judgment-scene is added to the *Book of the Dead* (chap. cxxv), and the soul is solemnly weighed in the 'hall of Double Justice (Maāt)' before the throne of Osiris. The confessions then put into the mouth of the soul before the Forty-two Assessors throw an important light on the moral notions of ancient Egypt before the days of the Exodus.

Literature: Jablonski, Pantheon Aegyptiorum (Frankfort, 1750–2; best collection of references in Greek and Latin writers); Lanzone, Dizionario di Mitologia Egiziana (Turin, 1881–6; deities figured and texts specified). Sacred texts: Book of the Dead, ed. by Lepsius (Leipzig, 1842) and Naville (Leipzig, 1886); translations by Birch, in Bunsen's Egypt's Place in Univl. Hist., v (1867); Pierret (Paris, 1882; rendered into Eng. by C. H. S. Davis, N. Y. and London,

1894); RENOUF, as far as chap. cxxxiii, Proc. Soc. Bib. Archaeol. (London, 1893–7); BUDGE, Papyrus of Ani (London, 1895), and Book of the Dead (London, 1898). Pyramid texts: MASPERO, Recueil. Other texts in Rec. of the Past, 1st and 2nd series. Early proverbial wisdom: VIREY, Ét. sur le Papyrus Prisse, Le Livre de Ḳaqimna, et Les Leçons de Ptah-hotep (Paris, 1887). General works: DE ROUGÉ, Essays in the Rev. Archéol., N.S., i; TIELE, Hist. of Egyptian Religion (Dutch, trans. by Ballingal, London, 1882); cf. TIELE-GEHRICH, Gesch. d. Religion im Alterthum, i. (1895), 17–124; RENOUF, Hibbert Lectures (London, 1882); PIERRET, Le Panthéon Égyptien (Paris, 1881); BRUGSCH, Religion u. Mythol. d. alten Aegypter (Leipzig, 1884–90); VON STRAUSS and TORNEY, D. altägyptische Götterglaube (2 vols., Heidelberg, 1889–90); MASPERO, numerous articles in the Rev. de l'Hist. des Religions (1880 ff.), some reprinted in the Ét. de Mythol. et d'Archéol. Égyptienne (2 vols., Paris, 1893; criticizes Brugsch); WIEDEMANN, Religion of the Ancient Egyptians (London, 1897). A shorter treatment will be found in MEYER'S Gesch. Egyptens (Berlin, 1887); ERMAN'S Life in Ancient Egypt (London, 1894); or MASPERO'S Dawn of Civilization (London, 1894); CHANTEPIE DE LA SAUSSAYE, Lehrb. d. Religionsgesch. (1897), i. 88–160; PETRIE, Religion and Conscience in Ancient Egypt (London, 1898).

II. **Babylonio-Assyria.** The study of the ancient civilization of Mesopotamia has shown its immense significance for the culture of the Mediterranean peoples. It touched Egypt, it spread through Canaan, it powerfully influenced Israel. It contributed to the mythology and possibly to some of the cults of Greece; and through the Greeks its primitive science—for instance, the signs of the zodiac—passed into Europe. It supplied much of the demonology of Judaism, and it is possible that some of its cosmic conceptions may have left their traces in Gnosticism. But it can hardly be ranked with Egypt as a mother of philosophies.

When the Babylonian religion comes into view in the fourth millennium B.C., numerous centres of government and of worship have been established in North and South Babylonia, and various elements of nationality have been already combined. The relation of the Semitic immigrant peoples to the previous occupants of the country is still obscure, and the chronological problems arising out of the attempts to determine the successions of kings are differently settled by different investigators. Concerning Sargon and Naram-Sin of Agane, about 3800 B.C., there is general agreement; but whether the priest-kings of Lagash, among whom Gudea figures, preceded or followed Sargon is still under debate. The religion of this age is already developed, and shows traces of the beginnings of organization. But it has not passed beyond the character of polytheistic nature-religion. The deities are revealed in the elemental forces: the moon, the sun, the stars, the courses of the seasons, the three great divisions of the universe—the sky, the earth, and the primaeval waters which surround and bear it up—these are the chief objects of interest, the embodiments of divine powers. At the bottom are magic and witchcraft, an immense multitude of spirits, evil and good. Babylonio-Assyrian religion does not descend as low as Egyptian animal worship; on the other hand, its doctrine of man and his destiny remains much nearer the animistic level, the condition of the wandering double (*ekimmu*) on earth resembling that of the usual disembodied ghost, and the gloomy underworld having no proper ethical character. Such philosophical interest as Mesopotamian religion presents seems rather to lie in its occasional efforts to rise above the fundamental polydaemonism and the polytheism superposed upon it. The term for a god, *il-u*, is identical with the widespread Semitic name which appears in Hebrew as *ēl*, but its derivation is still matter of discussion. A regular feminine was formed, which does not occur in Hebrew, and similarly an abstract *ilūt-u*, godhead or divinity, with which may be compared *anūt-u*, a corresponding abstract from the name *Anu*, the sky-god (Jeremias).

Anu appears already in the inscriptions of Gudea, forming the first member of a supreme triad. He represents the expanse of heaven. Beside him stand Bel, lord of the earth and its forces, and Ea, god of the ocean-deep, which encompasses the earth and lies beneath it. Theological arrangement here begins to be apparent. But though Anu is the supreme lord of all, and the father of the gods, who must obey his commands, he himself takes no leading part, and in the cosmogony mentioned below he is removed by several stages from the actual origin of the world of the gods. Another triad comprised the moon-god Sin, who could even be identified with Anu, the sun-god Shamash, and Ishtar (Venus) or

Ramman ('the thunderer'), god of rain and storm. But under Hammurabi (about 2250 B.C.) Babylon rises into political pre-eminence, and its local deity Marduk, already named in early texts, with the function of god of the spring-sun, is consequently elevated to the loftiest place. Day by day he rises out of the ocean, and so is the son of Ea, and he brings to light the hidden wisdom which lay in the mysteries of the deep. Year by year he wakens the dead to life, and in his character of 'the merciful' he heals the sick, sets free the prisoner, and protects the weak. Not only is he first-born and leader of the gods, he is lord of lords, ruler of the world, whose will heaven and earth obey. Accordingly, in one of the great cosmogonic myths, he is the creator; and he is even called 'god of gods' (Sayce, *Hibbert Lectures*, 501). Not even the rise of Assyria into empire (about 1400 B.C.), and the advent of its great god Ashur to power, overthrew his influence, for the monarchs of Nineveh sometimes made pilgrimage to Babylon. Ashur, indeed, was regarded by the theologians on the Tigris as lord of the world and maker of the earth. He typifies the political unity of the empire over which he presides. The other gods are little more than members of his court, the land bears his name, and the king's enemies are his foes. He is king of all gods, even 'father' who has created them (Sayce, *Hibbert Lectures*, 128). Most striking of all, he is self-existent, for he is 'the creator of himself.' But with the fall of Nineveh in 608 B.C. Ashur passes, and Marduk reappears in supremacy, so that Bel, Sin, Ramman, &c., even sometimes find their functions transferred to him. Marduk almost, if not quite, reaches the elevation of Amun-Ra in Egypt; but the Babylonian thinkers never formulated the Egyptian conception of continuity through change and renewal.

The early cosmogonic speculations were finally embodied in a 'creation epic,' which opens a series of poems in honour of Marduk. Before heaven and earth were named, when no god yet lived, there were only the heaving waters of the deep. The deep is personified as Tiâmat (equivalent to Thôm, Gen. i. 2), primaeval mother of heaven and earth. By a kind of evolutionary process the first pair of gods, Lakhmu and Lakhamu, are 'built' out of the chaos, and from them after many days two more, Anshar and Kishar, the male and female principles of heaven and earth. Then follow Anu, Bel, and Ea, and in due course Ea's son Marduk. Tiâmat dreads the growing power of the gods, and prepares for a great struggle by producing a brood of monsters to defend her. The elder gods are powerless for the conflict; Anu and Ea fail; but Marduk, installed as king, advances armed with the weapons of the storm, and attended by seven fatal winds. Tiâmat is caught in his net and slain; Marduk splits her gigantic carcase into two parts like a flattened fish, and one half is made into a covering for the heavens to hold back the waters. The earth is then constructed as a hollow hemisphere beneath the upper vault, spanning the great deep; the districts of the mighty Three—Anu, Bel, Ea—are marked out, and the courses of the heavenly bodies are fixed. The tablet describing the origin of the human race has not been preserved, but at the close of the series the children of men are enjoined not to forget Marduk, 'who created mankind out of kindness towards them, the merciful one with whom is the power of giving life.'

As might be expected with a people so observant of the heavens, the cosmologic speculations are pervaded by a strong sense of law and order, connected in particular with Sin (the moon-god) and Shamash (the sun), the latter especially being ethicized as 'the judge of the land, and the arbiter of its laws.' The Babylonian pantheon does not present any exact equivalent to the Egyptian Maāt, but the Thoth of the Nile finds a counterpart in the Mesopotamian prophet-god Nabu, 'proclaimer' or 'herald.' He is the impersonation of wisdom; son of Marduk, in the later theological system, he is *ilu tashmît-u*, 'god of revelation (causing to hear).' So he is the god of inspiration, and the source of science and literature. In this capacity Tashmît-um (feminine abstract) becomes his consort. And in virtue of the sovereignty of thought Nabu becomes for Nebuchadrezzar 'the upholder of the world,' 'the general overseer,' and his temple is 'the house of the sceptre of the world.' It is the mythological expression of the first principle of philosophy.

Literature: a very careful bibliography will be found in JASTROW'S Religion of Babylonia and Assyria (Boston, 1898).

III. **Persia.** Neither the Egyptian nor the Babylonian religion has any present representatives. But the followers of Zoroaster, known as Parsees in Western India, still preserve the sacred books in which the ancient teaching is embodied. First brought

to light by the adventurous French scholar Anquetil du Perron (1761), they have been supplemented by the study of additional literature in the same religious succession, and a large amount of material is now available. The sacred books are now known by the name of *Zend Avesta*. The term Avesta, which cannot be traced back further than the Sassanian kings (beginning 226 A.D.), denotes the sacred text, Zend being the commentary or explanation. The books so designated form no proper whole; they are the remains of a much larger literature. Their contents are various, liturgies and laws being mingled together. They are divided into three groups: (1) *Yasna* (Sansk. *yajña*, sacrifice), the principal liturgical book, in 72 chapters, used by the priests at sacrificial ceremonies in honour of various deities; (2) *Vispered* (*Vispe Ratavo*, 'all the chiefs'), in 24 chapters, based on the *Yasna*, and containing invocations to the spiritual heads; (3) *Vendidad* (*Vi-daeva-data*, 'law for the enemies of the daevas or evil spirits'), in 22 chapters, a priestly code of purifications and ecclesiastical penance.

The age of this collection is a problem of extreme obscurity. In its present form it is only the survival of a much more extensive mass, probably gathered together under the Sassanian kings, especially Shapur II, about 325 A.D. Much ancient literature was then believed to have perished, tradition attributing the destruction to Alexander the Great. The oldest portion is found in the five *Gāthās*, discourses of revelation and exhortation in metrical style and archaic language, now arranged in *Yasna*, xxviii–liii. The evidence of date is scanty and uncertain. Considerations of political circumstances, and comparison with the usage of the cuneiform inscriptions of the Achaemenian kings at Persepolis, Behistun, &c., especially in the treatment of the divine name Ahura Mazda, lead to the view that the materials of the younger part of the Avesta can hardly be later than 800 B.C., and the *Gāthās* may be two centuries earlier (Tiele). Haug placed the *Gāthās* about 1200 B.C., Mills possibly as early as 1500, or 1200–900. On the other hand, de Harlez is in favour of a date from 500 B.C. onwards; and Darmesteter (whose views have found no support) finally supposed them to be dependent on Gnosticism and the Philonic Platonism in the middle of the 1st century of our era. The antiquity of much of their doctrine is attested by the Greek writers, notably Theopompus in the 4th century B.C. Further materials are found in the *Bundahish*, a work of the Sassanian period, which repeatedly quotes older texts, and other Pehlevi literature of still later date.

The Avestan language and its mythological and ritual terminology at once disclose their relation to those of the *Vedic Hymns*. A number of equations can be immediately established, such as *ahura* and *asura*, *daeva* and *deva*, *haoma* and *soma*, *Yima* and *Yama*, *Mithra* and *Mitra*, *Vayu* and *Vāyu*, *Aramaiti* and *Aramati*. The objects of Avestan homage are designated the *yazatas* or 'worshipful ones' (Sansk. *yajata*); and behind the 'Lord all-wise' of the Zarathustrian teaching, with his associated 'immortals,' are the sun, moon, and stars, the fire and the waters, and other elemental powers, connecting the ancient religion with the early nature-cult of the eastern Aryans. And this in its turn sprang out of a still more ancient polydaemonism, survivals of which may be found in the crowds of good and evil spirits. Among the protectors of the living are the patron-spirits of the dead, the Fravashis, a conception which is generalized and extended from the house to the village, the district, and the province, and affects even the unborn. Originally analogous to the Vedic 'fathers,' the term comes to include the genius or ideal type of a whole nation, and can be applied also to 'the Lord' himself. Other factors sprang from the nomadic life of the ancient people, the cow and the dog having a special place in mythology and sacred law. And yet others seem to have been derived from foreign contact, like Anāhita, a goddess later associated with Mithra, but now recognized as of Semitic origin.

It is upon this field that Zoroaster (Zarathustra) appears. The Gāthic hymns represent a period of religious conflict. The people are divided between two hostile cults. 'Hard by the believer in Ahura,' complains the prophet, 'dwells the worshipper of the daevas.' The first are cattle-breeders, to whom the care of the cow is a sacred duty; the second maltreat it, and slaughter it in their sacrifices. Zoroaster is in the thick of the struggle. He is a *zaotā* (Vedic *hotā*) or priest; he is *mañthran* (cf. Vedic *mantrin*), endowed with the holy word; he is *dūta* (Sansk. *dūta*), 'sent,' a messenger or apostle. The scene is in North-east Iran, in the district known as Atropatênê (modern Azerbijan),

between the S. Caspian and Lake Urumiah: his family name is said to have been Spitama: he has a wife and sons and daughters. Later legends embellish his career, but (save for his colloquies with Ahura) the oldest texts contain no wonders. His historic personality has, however, been questioned (Tiele, Kern, Darmesteter), yet it is plain that the movement of reform indicated in the *Gāthās* (assuming their antiquity) must have had some leaders. Such guidance seems sufficiently supplied by Zoroaster; and though all detail is uncertain, some dominant mind is required to explain the new thought; only some personal energy—even with a priestly circle to support it—could have communicated the original impulse. Jackson, following Pehlevi tradition, thinks it safe to date his birth in 660 B.C., and his death in 583 B.C., at 77 years of age. This hardly seems to give time for the linguistic changes already obvious in the inscriptions of Darius; and even if the Greek date (Xanthus the Lydian, about 450 B.C., puts Zoroaster 6000 years before Xerxes) be explained by assuming that the statement refers to the formation of the spiritual body of Zoroaster (as described in the *Bundahish* many centuries later), the philological argument drawn from the general character of the language remains untouched. West therefore (*S. B. E.*, xlvii. Introd. § 78) concludes that 'at present we have no really historical information about the origin of Zoroastrianism, and must still consider it as decidedly prehistoric.'

The supreme figure in Zoroastrianism is that of Ahura Mazda, 'lord all-wise.' Knowledge, holiness, beneficence, creative power, sovereign sway, and sustaining energy are all united in him (see the two lists of his titles in *Yasht*, i, *S. B. E.*, xxiii. 24–8). He is 'bright' and 'glorious,' but no form is ever ascribed to him. He is addressed as *Mainyu Spenista*, 'most bountiful spirit[1],' and he is 'maker of the material world.' He is revealed in light; he puts on the sky as a garment (*Yasna*, xxx. 5, i. 1; *Yasht*, xiii. 3), and the stars are poetically described as his 'body' (*Yasna*, xxxvi. 6). But Herodotus observed that the Persian worship was conducted without temples or images, 'because they do not think that the gods have human forms as the Greeks do.' Associated with him are six (or seven) 'immortal holy ones' (*Amesha-Spentas*): *Vohu Manah*, 'good thought'; *Asha Vahista*, 'most excellent righteousness'; *Khshathra vairya*, 'the kingdom of the divine will'; *Spenta Armaiti*, 'holy piety'; and the sacred pair *Haurvetat* and *Ameretat*, 'health' or 'perfection' and 'immortality.' With these Ahura seems sometimes himself to be reckoned; but the number seven is otherwise completed by *Sraosha* (lit. 'hearing'), the angel of Obedience. These ideal powers play a great part in Zoroastrianism. Such are Daena, impersonation of sacred law, who belongs to the heavenly creation, produced with the light; and Mañthra Spenta, the Holy Word, applied to the revelation issuing from Ahura's mouth. And such in another connection were the *ratus*, the types or ideas of all classes of beings or objects, ranged in hierarchic order, like the grades of imperial administration, the highest being identified with the Amesha-Spentas. Among these *Vohu Manah* and *Asha Vahista* form with Ahura an inner group of three. The first closely resembles *Spenta Mainyu*, which is sometimes identified with Ahura, and sometimes regarded as a kind of emanation from him, or again as something possessed by him. The second is philologically equivalent with the Vedic *Rita* (see below, *India*), and expresses the idea of order in the universe as the foundation of righteousness. Mythologically, Asha is conceived by Ahura for the worlds; or, again, Ahura is the creator of Asha 'when his all-glorious conceptions clothed themselves in the stars'; and the Mazdayasnian confession of faith declares its trust in Ahura, 'whose is Asha, whose are the stars, in whose lights the glorious beings and objects are clothed.' Asha has other functions, ritual and moral; the cosmic, the ceremonial, and the personal being after all only different aspects of that order which, to the ancient Iranian, was more than 'heaven's first law,' and could be identified with deity himself, 'My name is Asha Vahista—most excellent righteousness' (*Yasht*, i. § 7).

Over against the realm of Asha, chosen by the Holy (or Bountiful) Spirit, is the sphere of the 'Lie.' What is the relation of the opposing powers? It is difficult to state it with precision, for the expression of it is poetical, and not philosophic; and it is variously represented in the different parts of the Avestan texts. In the *Gāthās* it seems to have its root in the moral antithesis of good and evil as a fact in human life. This is carried back indefinitely to

[1] The term *spenta* has the meaning at once of beneficence and holiness.

a primaeval conflict, when twin spirits strove for the better and the worse in thought, word, and deed (*Yasna*, xxx. 3). As they met, they produced life and unlife[1], determining how at last there should be for the wicked the worst state, and for the righteous 'the best mind.' Then the wicked one chose the evil, but the most bountiful Spirit chose Asha and 'righteousness.' The world is thus the scene of continuous struggle between the most holy spirit (*Mainyu Spenista*) or Ahura and the evil spirit (*Añra Mainyu*). As the essential being of Ahura is truth, symbolized by light, so his counterpart is pre-eminently 'the lie' (*druj*), and his kingdom is darkness. In the *Gāthās* this is altogether conceived in the moral and spiritual realm. Night, which discloses the stars, is a part of the world's order; and accordingly the prophet, preparing to sing Ahura's praise, asks: 'Who as a skilful artisan hath made the lights and the darkness? Who made sleep and wakefulness? Who spread the auroras, noontide and midnight, monitors to discerning men, duty's true guides?' (*Yasna*, xliv. 5). It was even Ahura who decreed the penalties on the wicked, as the discerning arbiter who rewards and punishes hereafter. But after a time the moral struggle was found to be reflected in the universe. Disease and death, cold, drought, and hunger, and physical suffering of all sorts, are the creation of Añra Mainyu, or are produced by the *daevas*, over whom he rules. The *Bundahish*, accordingly, following earlier authority (cp. *Yasht*, xiii. 77), describes the mode in which the evil spirit endeavours to neutralize Ahura's work. The dualism thus implied, however, is of a very qualified kind. Añra Mainyu (who is never accounted for) is neither omniscient nor almighty. He does not know of Ahura's existence till he arises from the abyss and sees the light. And his doom is fixed; at the resurrection his creatures will perish, and he himself also will be destroyed. Philosophy has not been altogether content with these uncertainties, and has attempted in some way to unify the opposing powers. Traces of two modes may here be mentioned. Erroneous exegesis of *Vend.*, xix. 9, suggested the view that both Ahura and Añra Mainyu (Ahriman) were the joint offspring of a higher being, Zarvan Akarana, 'boundless time.' Others, like the Gayomarthians, maintained that Ahriman was in some sense a product of Ahura; and his origin was ascribed to the suspicion which sprang up in Ahura's mind, 'Perhaps an antagonist may arise to oppose me' (*Dabistan*, trans. Troyer, i. 356).

The conflict between the two powers is not everlasting. It was a fundamental postulate of religion that the good must triumph. This is embodied in the Zoroastrian eschatology, which provides both for the individual and for the world. For the human being (see two lists of his immaterial faculties, *Yasht*, xiii. 74 and 149) a judgment is provided immediately after death, with an appropriate allotment to the heavens or hells of good and evil thought, word, and deed. The duration of these awards was limited, but varying gradations of intensity secured a complete moral equivalent for the guilt or merit of the past. A regular chronology was gradually worked out, according to which the world would come to an end after an existence of 12,000 years. The great consummation, the *frashokereti* ('forwards-making,' the renovation which would make the world go forwards), would begin. Inaugurated by a general resurrection, the hour of victory over the *druj* would arrive. The mountains would melt, and the barriers set by the hills would disappear. A purified humanity would become immortal; the evil spirit would be conquered and destroyed; the last recesses in which he had taken refuge would be consumed, and hell would be brought back for the enlargement (or prosperity) of the world. By this means the choice offered by the Supreme Wisdom to the guardian spirits of men at the outset was justified. When he was about to present them to the world he inquired whether they would contend with the Lie-power, knowing that it would perish and they would be given back to the world immortal, or whether they would be protected against it from the outset. And they chose, as he chose for them, to be made capable of warfare, to strive for everlasting life (*Bund.*, ii. 10–1).

Literature: older works by HYDE (1700), ANQUETIL DU PERRON (1771), KLEUKER (1776), RHODE (1820), &c. Avesta, text ed. by GELDNER (1885–96); Bundahish, by JUSTI (1868); BURNOUF, Commentaire sur le Yaçna (1833). Trans. of the Avesta by SPIEGEL (1852–63), with commentary (1865–9); by DARMESTETER and MILLS, S. B. E., v, xxiii, xxxi; by DARMESTETER, Ann. du Musée Guimet, xxi, xxii, xxiv (1892–3);

[1] Variously interpreted as life and death, reality (i. e. all good and perfect things) and unreality (the delusive and vain), &c.

and by DE HARLEZ, Biblioth. Orientale, v. (1881). The Gāthās, with texts and trans. (ed. MILLS, 1894); trans. also by HAUG, Essays on the Parsis (3rd ed., 1884). JUSTI, Handb. d. Zendsprache (1864). Pehlevi Texts, trans. WEST, S. B. E., v, xviii, xxiv, xxxvii, xlvii. Greek testimonies collected by WINDISCHMANN, Zoroastrische Stud. (1863); trans. SANJANA, Zarathushtra in the Gāthās, &c. (1899); and by A. V. WILLIAMS JACKSON, Zoroaster, the Prophet of Ancient Iran (1899). Linguistic and literary material in Grundriss d. Iranischen Philol., ed. by GELDNER and KUHN. Historical materials collected by SPIEGEL, Eranische Alterthumskunde (1871–8); GEIGER, Civilization of the Eastern Iranians (trans. SANJANA, 1885–6). Works on the Zoroastrian religion: TIELE, De Godsdienst van Zarathustra (1864); Geschiedenis van den Godsdienst (1893–1901: trans. Gehrich, Gesch. d. Religion, ii, 1898); DARMESTETER, Haurvetāt et Ameretāt (1875), Ormuzd et Ahriman (1877), and introductions to his translations; HAUG, Essays (3rd ed., 1884); SAMUEL JOHNSON, Oriental Religions, Persia (1885); Life of Zoroaster, by A. V. WILLIAMS JACKSON, as above. See further, GELDNER, 'Zoroaster,' Encyc. Brit. (1888). On the Persians generally: RAWLINSON, Five Great Oriental Monarchies (2nd ed., 1871), iii; DUNCKER, Hist. of Antiquity, v; MEYER, Gesch. des Alterthums (1884), i; JUSTI, Gesch. d. alt. Persiens (1879, Oncken's series); religion, LEHMANN, in Lehrb. d. Religionsgesch. (ed. Chantepie de la Saussaye, 1897), ii.

IV. **India.** Indian philosophy is organized historically under the influence of Brahmanical orthodoxy in the so-called Six Darçanas ('views' or systems) named below. These, however, only hold the field after the decline of Buddhism, and they represent the issue of long processes of thought which began at an exceedingly early date. Their main problems were metaphysical; ethical theory was always subordinated to practical methods of moral culture; and political conceptions did not exist. But speculation busied itself very early with the fundamental ideas of ontology; and the varying phases of this activity, the interest which it evoked, its influence on social life, and the protests and reactions generated by it, form a most significant if also highly complicated history. Special difficulties arise out of the vastness of the literary product in which this history is contained, and the absence of any proper chronology. The general succession of the strata of Vedic literature is sufficiently well established, though no definite dates can be assigned. Monumental evidence first becomes available in the reign of Açoka, 263–226 B.C. (Duff, *Chronology of India*, 1899), whose inscriptions (combined with other materials) make it possible to fix the rise of Buddhism in the latter half of the 6th century B.C. The greater part of the canon of the Three Pitakas belongs to the century and a half following the Buddha's death, and may be ascribed to the period before 300 B.C. Very important evidence for the different tendencies of contemporary thought is to be found in the Buddhist texts, just as later works of other schools abound in proofs of the independence and intensity which marked the pursuit of philosophy in India for more than 2,000 years.

THE VEDAS. The beginnings of speculation are to be found already in the hymns of the *Rig-Veda*. The background out of which they emerge is that view of nature held by the peoples of the lower culture. The elemental forces and objects are themselves divine agents—earth and sky, fire and wind, sun and storm—but these have long been personalized, though they have never acquired such marked theanthropic forms as in Greece; and the mythologic process has never connected them so definitely with specific sacred spots as to make their biographies possible from a nativity to a tomb. The germs of philosophical thought may be seen (1) in the attempts at classification of the gods; (2) in the prominence given to conceptions of law and order; (3) in the various modes of relating the Many to the One; and (4) in the different phases of cosmogonic speculation. Thus (1) the determination of the number of the gods at thirty-three seems to reach far back into Aryan antiquity, as it is found also in the *Zend Avesta*, and may be possibly of still wider usage. But these are classed among three zones—the sky, the earth, and the intervening atmosphere (*R.-V.*, i. 139, 11)—though they are not always distributed by the Brahmanical explanations quite in the same way. More important (2) is the emphasis again and again laid on their law-abiding character. The uniformity of nature early attracted attention, and is explained by the decrees or commands (*dharman, dhāman, vrata*) laid by the gods upon the flow of the rivers, or the movements of the stars; while the ordered course of the world from day to day is mythologically embodied in the *Rita*

(the Zend *asha*), of which the gods are the guardians alike in its physical and its moral aspects, an early synthesis of the highest value reached by poetic intuition. The view of the world's unity (3) implied in the conception of the *Rita* naturally produced various attempts to get rid of the plurality of deities. They were syncretistically united in pairs, Indra-Agni, Mitra-Varuna, &c.; they were generalized as Viçve Devas, 'the gods together'; they were regarded as manifestations of an ulterior reality, 'the One with many names'—'the sages call that One in many ways'—and as such they shared a common deity, *mahad devānām asuratvam ekam*, 'the great *asura*-hood [Sansk. *asura* = Zend *ahura*] of the gods is one' (or perhaps 'great is the *asura*-hood of the gods, it is one'). This mysterious One is in turn identified with various principles. Such is *Aditi*, the 'infinite,' who comprehends all space and time, and who is all gods and men. Such is *Prajāpati*, 'lord of creatures,' and other similar forms (cf. *Skambha*, 'support'; *Prāna*, 'vital breath'; *Kāla*, 'time,' in the *Atharva-Veda*). Two terms especially emerge, destined to be of high significance hereafter: (*a*) *Brahman* (cp. Deussen, *Gesch. d. Philos.*, i. 240–8; Max Müller, *Six Systems*, 68 ff.), conceived as the supreme energy of the universe, comprising finite and infinite, past and future, within it; and (*b*) *Ātman*, the breath or living principle, and so the 'self'; sometimes applied to particular deities (*Parjanya*, the fertilizing rain; *Sūrya*, the sun; *Vāyu*, the wind), each as the 'self' of the gods, or dimly apprehended as the ultimate Brahman. Lastly (4) cosmogonic speculation is busy with the origin of the universe. It is attributed to *Viçvakarman*, 'maker of all things,' or to *Prajāpati* in the shape of the 'Germ of golden light' (according to the addition in *R.-V.*, x. 121, 10), or to *Purusha*, the cosmic 'Man' whose sacrifice produces the heavens and the earth and all that is therein. Most famous of all is the effort of the seer (*R.-V.*, x. 129) to carry thought back to the primaeval darkness, when there was neither *sat*, 'what is,' τὸ ὄν, nor *asat*, 'what is not,' τὸ μὴ ὄν, neither death nor deathlessness. Then 'that One' was born by the power of heat, and through Kāma (hot desire, or love) was at last evolved the world we know.

Early Brahmanism. Many of the terms which the later schools will freely use may thus be traced back to the speculations which found their way into the Vedic canon ere the collections of the ancient hymns were complete. In the ritual treatises known as the Brāhmanas, based upon the sacred texts, Prajāpati appears again and again as the emblem of unity, and various myths representing different stages of speculative advance out of the lower culture describe his creative functions. But the great contribution to thought made by the age of early Brahmanism was concerned with the interpretation of human life rather than divine. In the Vedic hymns the destiny of the dead is depicted much on the lines of higher animistic expectations elsewhere. The 'fathers' have passed into the realm of light in the sky; and though the hereafter is not without traces of ethical discrimination, there is no clear principle controlling the dispensations of the future, still less the circumstances of to-day. But the Buddhist texts represent the theory of transmigration as fully developed in the Brahmanical teaching, and as under the strictest moral law. It must, therefore, have been elaborated in the interval; but from what sources? The belief that the souls of the dead pass into animals, and even trees or plants, recurs among many races, and may have been adopted by the immigrant Aryans from the aboriginal peoples (Gough, Rhys Davids, Garbe). Apart from the hostility shown to them and their beliefs in the Vedic hymns, this hypothesis could at the utmost only explain the first suggestion, for the hints of the ancient texts point in a different direction. Already in *R.-V.* x. 129 there is a contrast between the sphere of death's power and the region of the deathless. Observation of the physical world suggested cycles of origin and decay; the dawn was reborn daily, and this rebirth (*punarbhava*) was the mythological statement of the maxim that whatever has a beginning in time must also have an end. Connection with material form (however refined) thus involved production and dissolution, where redeath (*punarmrityu*) corresponded to rebirth. But what regulated these processes for any given individual? There are indications that this problem was at first withheld from open discussion, and was treated as a secret mystery. The answer was finally reached along the line of the continuity of the product of a man's life. This was the doctrine of the 'deed' (*karman*). Every deed was regarded as producing something; it had a value, and this value remained even when the physical form of the agent and the external content of the action disappeared. The value might be only

ritual or ceremonial, but it might also be moral. Accordingly it was laid down that 'the deed does not perish' (*karma na kshīyate*), and still more explicitly 'a man is born into the world that he has made' (*Çatapatha Br.*, VI. ii. 2, 27). This is applied first to the world of sacrifice, but it was soon extended to the whole world of conduct, including that of thought and feeling, so that death conveyed each person into a new environment of happiness or suffering suitable to his case. Moreover, as the product of any life contains elements of various value, each of these must in turn receive its appropriate requital, and different heavens and hells arose in imagination to supply the moral demand. As the individual passed from one to another, he was in fact laying up fresh *karma* all the while; and as long as he remained traversing this course of existences (*samsāra*, the vb. *samsarati*, to 'pass through' or 'traverse'), he was rigidly encompassed by its inflexible self-operating law, but he had his destiny in his own hands. Finally, this explanation was applied to the circumstances of the present. Wealth and poverty, the vicissitudes of accident or disease, peculiarities of outward lot or inward disposition, were all interpreted as the product of the past. The existing distribution of comfort or pain, the qualities of character for good or evil, were all the direct result of previous action. The entire universe, therefore, from the topmost heaven to the lowest hell, was under the sovereignty of this principle. In due time the world of space and time would come to an end. But the potencies of *karma* were indestructible, and after an interval a new age (*kalpa*) would begin with a fresh order generated to give them their necessary field. Thus the whole problem of suffering fell away. Each separate individual—god, man, animal, demon—always and exactly got what he deserved.

But over against the sphere of phenomenal existence which was in death's power, lay the realm of the deathless. How was this to be reached? Its attainment was, in fact, the great object of philosophy. The majority of men, indeed, did not seek it. But the evidence first of the Upanishads and next of the Buddhist texts shows that in the middle Ganges valley in the 7th and 6th centuries B.C. there was an immense amount of eager discussion concerning it, both within and without the ranks of the Brahmanical caste. The Brahman himself might retire after due performance of ceremonial duty up to middle life, and tend the sacred fire in some forest retreat, or he might adopt the style of a wandering ascetic. Many lay teachers, likewise, followed the same quest. The Greek ambassador Megasthenes at the court of Chandragupta (315 B.C.) reported that these ascetics discussed the constitution, shape, and limits of the universe, the relation of the Deity to it, and the nature and immortality of the soul. That summary corresponds sufficiently well to the records of early philosophical inquiry in the Upanishads, and to the reports of the Buddha's colloquies with his contemporaries. But it misses one essential feature: the aim of the higher knowledge was to escape from the phenomenal succession of existences into the realm of the unborn and the uncompounded which was beyond the reach of death. The solution which first established itself within the limits of Brahmanical orthodoxy (afterwards embodied in the *Vedânta*, see below) was founded on the two conceptions already named, the Ātman and the Brahman. The doctrine of the 'self' rests primarily on the older animism, but it is worked into a kind of physiology and psychology on the human side, and is then employed metaphysically on the cosmic side. Any given existence contains two sets of elements: (1) those belonging to his particular corporeal being, which cease at death, and (2) those belonging to his continuous existence in the cycle of transmigration. Among the latter the most important are the *Prānas* or vital powers, potencies rooted in a kind of spiritual body which operates through the corresponding members of the physical organism. In man these belong (1) to the conscious and (2) to the automatic or unconscious life. In the first group are five of knowledge (the senses) and five of action (speech, hands, &c.), all being under the control of *Manas* (= *mens*), a kind of 'common sensory,' which acts as a medium between the higher intelligence (*Buddhi*) and the corporeal frame. The place of the 'self' in this scheme is not clear. It is sometimes located in the cavity of the heart; it is in size like a grain of barley or rice, or it is as big as a thumb; its shape is that of a man; its aspect is that of a yellow robe, smoke-coloured wool, a flame, a white lotus, light without smoke, &c. Such was the 'self' to simple imagination (cf. T. W. Rhys Davids, *Journal of the Royal Asiatic Soc.*, 1899, 71). But it had another character when its particular limitations were dropped. Behind the world of

sense lay the world of thought, which was not divided into separate individuals, but was common to them all, and gave to the world of external phenomena its true unity. The universe could not be apprehended by a mere enumeration of its contents; that which constituted it as its Self could only be reached through thought. This was present, therefore, everywhere, alike without and within, in the cosmos and in the heart, incapable of multiplication or of partition. A true view of life requires us to merge our individuality in the universal Self. The distinction between subject and object then disappears. The Self transcends both the knower and the known. As it cannot be differenced from anything else, it is unconditioned, and its only marks are 'no, no'; if it is represented in symbols, it is infinite like space, but as it is without dimensions, it may equally well be called a point. This lay behind all successional existence, and the realization of union with it brought deliverance from the *samsāra*. In another aspect, however, the world had been already identified as a manifestation of Brahman (masc. *Brahmā*, neut. *Brahma*). In the scene of visible things he constituted a sort of universal Prāna, including in one unity space, time, light, heat, sun, fire, the creative word, &c. But the world known to sense was only a veil of the reality within. Think all actual objects away; is Brahman thereby abolished? The answer was, 'Assuredly not': he is 'the true of the true,' he is *ekam advitīyam*, 'one without a second.' So the cosmic unity was identified with the unity which lies at the root of all self-consciousness, and the Brahman in the heart was the Self without passions or parts, the light of lights. If a quasi-reality was admitted in the world, during any given *kalpa*, the Brahman might be regarded as the great Brahmā, supreme, all-seeing, Maker, Disposer, Father of all beings, and a provisional theism was recognized. But if the unreality of individual existence was truly discerned, it followed that the world was unreal, too: it owed its aspect for sense to our ignorance, it was even the product of that ignorance (*avidyā*); and from this there was no deliverance save through the recognition of the illusory character of corporeality, and the perception of the fundamental identity of the Self with the ultimate Brahman. This was expressed in the formula *Tat tvam asi*, 'that art thou.' Then the world of ritual and Vedic study, even of ordinary moral relations, is left behind. Acts producing merit cease. Freed from the bondage of desire, such a one 'stands blessed in the Brahman, who longs for a true man.'

The eagerness with which the speculations concerning the 'self' were pursued may be inferred from the conspectus of sixty-two wrong views about it according to the Buddha (*Dialogues*, trans. T. W. Rhys Davids, i. 27–52). Among these was the fourfold error of the 'Eternalists,' who maintained that the soul and the world were eternal, in which the germ of the *Sānkhya* system (see below) is probably to be detected. The antecedents of others of the six Darçanas may also belong to the great formative age in Indian philosophy from the 6th to the 3rd century B.C. But there is no record of their characteristic terminology, still less can they show any literary product like the Upanishads, some of which may be confidently ascribed to the pre-Buddhistic age (for a tentative chronological arrangement see Regnaud, *Matériaux*, i. 20). On the other hand, there were teachers daring enough to deny the first principle on which the Brahmanical philosophies were all based, viz. *karma*. Such, among the Buddha's contemporaries, was the agnostic Sanjaya, who repudiated all knowledge of the subject; the materialist Ajita of the hairy garment, who allowed no other life, rejected the claim to knowledge by higher insight, and resolved man into the four elements—earth, water, fire, air—which dispersed at death; the indifferentist Purana Kassapa, who acknowledged no moral distinctions, and consequently no merit or reward; and the determinist Makkhali of the Cow-pen, who indeed recognized the *samsāra*, but admitted no voluntary action, and hence no *karma*, each individual only working out the law of its nature which it could not modify or control, the sole cause of everything being found in *niyati*, destiny, impersonal necessity or fate (*Dialogues*, trans. Rhys Davids, i. 69–75).

Literature: general works on the religions of India: SAMUEL JOHNSON, Oriental Religions, India (1873); BARTH, The Religions of India (1882); HOPKINS, The Religions of India (1895). (1) Vedic Period: complete translations of the Rig-Veda, by GRASSMANN, 2 vols. (1876–7); by LUDWIG, 5 vols., with comm. (1876–83); and by GRIFFITH (Benares, 1889–92). Texts and translations in MUIR, Sanskrit Texts, v. (1872); selected hymns, trans. by MAX MÜLLER, Hist. of Sanskrit Lit. (2nd ed., 1860); cf. Hibbert Lectures (1878) and Six Systems (1899); SCHERMAN, Philos.

Hymnen a. d. Rig- und Atharva-Veda Saṃhitā (1887); cf. DEUSSEN, Allg. Gesch. d. Philos., I. i. (1894). On the whole early period, HARDY, Die vedisch-brahmanische Periode der Religion des alten Indiens (1893). On the religion of the Rig-Veda, OLDENBERG, Die Religion des Veda (1894), and MACDONELL, Vedic Mythology (in Bühler's Grundriss, III, i, Heft A, 1897). (2) Early Brahmanism. Translations of the Çatapatha Brāhmana by EGGELING in S. B. E., xii, xxvi, xli, xliii, xliv, and of the Aitareya Brāhmana by HAUG; translations of eleven Upanishads by MAX MÜLLER, S. B. E., i and xv; of twelve by RÖER, COWELL, and MITRA (edited by Tookaram Tatya, Bombay, 1891); and of sixty (Sechzig Upanishads des Veda) by DEUSSEN (1897). On the philosophy of the Upanishads, REGNAUD, Matériaux pour servir à l'Histoire de la Philosophie de l'Inde (i. 1876, and ii. 1878); GOUGH, The Philosophy of the Upanishads (1882); DEUSSEN, Allg. Gesch. d. Philos., I. ii. (1899); cf. MAX MÜLLER, Six Systems, 159–83.

Jainism. Among the schools thus flourishing at the time of the foundation of Buddhism a word must be said about the Jains, who still exist as a religious community in India. They are the followers of the Jina, or Conqueror, known otherwise as Mahā-Vīra, the 'great hero,' whose career as teacher ended a little before that of his better known and younger contemporary, the Buddha. Like the Buddha he came to be regarded as the successor of others who had preceded him. Accepting the theory of transmigration under the law of *karma*, he taught a way of deliverance founded on perfect knowledge, faith, conduct, and austerities. In the metaphysical discussions mentioned above, the Jains avoided definite answers by the doctrine formulated as *syād-vāda*, 'it may be,' in opposition to Sanjaya's agnosticism (Jacobi). This method permitted the affirmation or denial of the same thing from different points of view, so that contrary qualities could be regarded as coexisting in one single object. The right knowledge was that taught by the Jina, and dealt first of all with six substances: *Dharma*, whose characteristic was motion, and *A-dharma*, whose characteristic was immobility (both co-extensive only with the world of visible objects), space, time, matter, and souls; these are the *astikāyas* or 'realities.' Souls (which belong to plants as well as to animate beings, and even to particles of earth, water, and fire) are eternal and self-subsistent; but they are entangled (in a manner imperfectly explained) in the process of transmigration, owing to action and its consequent *karma*. Through the recognition of the influence of *karma* in determining the soul's destiny, the Jain doctrine is classed among the *kriyāvādas*, or systems which maintain that action has an effect on the soul. The quest of deliverance, therefore, took the form of cessation from action, and this in its turn led to extreme asceticism (one group, known as the 'air-clad,' discarded all clothing), and immense stress was consequently laid on self-control, the exercise of will, and the maintenance of a state of moral tension. In the details of Jain teaching, which was never very systematically organized, there are affinities with the modes of thought afterwards developed in the Sānkhya and Vaiçeshika philosophies: but its speculations are still somewhat confused and incoherent. The Buddhist texts report various cases of discussion with eminent Jains, and occasional conversions (contrast *S. B. E.*, xvii. 108–115, with xxii. 65). For recent bibliography, see Jacobi in *S. B. E.*, vol. xiii, p. xv.

Buddhism. Most important of all the protests against the Brahmanical philosophy was the system of ethical culture founded by Gotama the Buddha, known in the West as Buddhism. This term, however, covers a great variety of beliefs, which may be roughly divided (for present purposes) into two great groups: (1) early Buddhism, presented in the Pāli canon of the 'Three Baskets' (*Ti-pitaka*), preserved in Ceylon, Burma, and Siam, characterized by complete rejection of all metaphysical conceptions, and (2) advanced Buddhism, as exhibited in the Sanskrit Scriptures of Nepal, and the colossal literatures founded upon them in China and Tibet, resulting from the assimilation of transcendental ideas with the primitive teaching. Historically, Buddhism takes its rise in the person of Gotama, son of a chieftain of the Sākya clan, who adopted the life of a wandering ascetic at the age of twenty-nine, devoted six years to the search for truth, was believed to have attained supreme enlightenment (to have become a Buddha) at thirty-five, spent forty-five years in teaching and superintending the Order or union of disciples instituted for the promotion of the doctrine and the cultivation of the higher life, and finally died at the age of eighty, his body being cremated, and the relics distributed among the clans of the adjoining districts (B.C. 477, Max Müller; 480, Oldenberg; born

about 600, Rhys Davids). How much of the theory of Buddhahood was elaborated in the Buddhist schools cannot here be discussed. The texts represent Gotama as one of a series (seven, or even twenty-four); and they further imply that an expectation was widespread in the middle Ganges valley that *Mahā-purisa* (Sansk. *purusha*), 'the great Man,' would appear, and would become either a universal monarch ruling in righteousness, or a blessed Buddha lifting off from the world the veils of ignorance and sin. This is the centre of the highly poetical mythology of Buddhism, and a point of departure for its subsequent metaphysical development.

The teaching of Gotama was necessarily closely related to the general ideas of his age. Like the Brahmanical philosophy, it assumed the process of transmigration and the doctrine of *karma*, and aimed at providing a way of deliverance from liability of rebirth. Like the higher Brahmanism, it recognized the gods of the popular religion within the limits of the same process, but it boldly stripped the great Brahmā himself of his attribute of self-existence, and asserted that he, too, would cease to be. For Gotama repudiated all metaphysical conceptions, and again and again refused to enter on transcendental discussions (such as whether the world was infinite and eternal, or limited in space and time; see the 'Ten Indeterminates,' *Dialogues*, trans. Rhys Davids, i, 187, 254). He would deal only with the world as he knew it, a world which observation showed to be in a state of perpetual change, of growth, decay, and dissolution. All sentient existence (and with this alone he was concerned) was under this law. The first fact of conscious life, properly understood in all its bearings, is Suffering, for even birth and the joy and energy of youth lie in the shadow of old age and death. The Buddha further knows its Origin, the mode of its Cessation, and the Path which leads to that Cessation. These are the Four cardinal Truths, expounded with extraordinary variety of illustration and clearness of moral insight, and enforced by a personality of such nobility and attractiveness that it could become for uncounted millions a permanent object of devotion.

The Origin of suffering is found in the delusion of individuality, and is explained in an elaborate formula known as the 'Chain of Causation.' Briefly, the whole is summed up in the doctrine that there is no 'self' (*an-atta* [Pāli *attan* = Sansk. *ātman*]), and that the appearance of separateness is due to error and ignorance, which beget the craving after the gratification of personal desire. The insistence on the polemic against the Brahmanical doctrine of the 'self' shows the immense importance which the Buddha attached to this central idea. It is the subject of his first discourse after attaining Buddhahood, in which his psychological theory is set forth. Any given individual is constituted by the union of a number of elements, bodily and mental, known as the *khandhas* or 'aggregates.' These fall into five groups (which are afterwards minutely subdivided, though the classifications appear to cross and recross), viz. (1) the attributes of bodily form, *rūpa*; (2) the sensations, *vedanā*; (3) the perceptions, *saññā*; (4) the conformations, *sankhāra*, distributed among thought, word, and deed; (5) consciousness, *viññāna*. With none of these can the self be identified; but as they are regarded as producing any specific being by their union, the conclusion is that there is no permanent self; at death the *khandhas* fall apart, and the individual is no more. As long, however, as he is involved in the process of transmigration, his *karma* remains, and, by a mystery known only to the Buddha, produces a new being in an appropriate environment. This new being is morally continuous with the preceding, though without memory of its previous existence. The insight of supreme wisdom, however (as in the case of Pythagoras), can detect the identity of character, and travel back through life after life.

The way of deliverance, therefore, must lie in the attainment of that condition in which the craving after individuality will be eradicated, and the roots of the accumulation of *karma* cut off. This is the realm in which there is no death, because there is no further rebirth; it is the realm of the unborn, the uncompounded, which decay and dissolution cannot harm. Among other epithets for it is the term *nirvāna* (Pāli *nibbāna*), not found in the pre-Buddhistic Upanishads, and possibly, therefore, a new coinage. It denotes the 'going out' (like the flame of a lamp), and it is applied (as Prof. Rhys Davids first showed) to the dying down or 'going out' of the three fires of lust, ill-will, and delusion or dullness. This state of perfect holiness was only reached after long moral discipline, on which Gotama laid the whole stress of his teaching. This discipline was known as the 'Noble Eightfold Path'—the practice of Right

Views, Right Aspiration, Right Speech, Right Conduct, Right Livelihood, Right Effort, Right Mindfulness, Right Rapture or Meditation. Each of these terms is only a summary of manifold energies of thought, feeling, and will, in various combinations and applications. As the believer advances along the Path, he gradually breaks through the Ten Fetters which detain him in the bondage of transmigration, the 'delusion of being a self,' 'doubt,' 'belief in the efficacy of good works and ceremonies,' 'sensuality,' 'ill-will,' 'love of life in material existence,' 'love of life in immaterial existence,' 'pride,' 'self-righteousness,' and 'ignorance.' Complete emancipation is thus attained, and the Buddhist saint, or *arahat*, is reborn no more.

The theory of life thus sketched found its goal in the achievement of perfect holiness. That holiness was indeed conceived first of all as requisite for deliverance from transmigration. But it came to be regarded as an end in itself, and the true Buddhist loved goodness for its own sake. By degrees, however, the emphasis shifted. The *arahat* only saved himself, but the Buddha offered salvation to the world. Partly under the influence of the passionate missionary spirit which Gotama infused into his Order, the moral ideal changed. An imaginary biography of the Buddha's antecedent lives was constructed, and it became the duty of the disciple to emulate the Teacher by aspiring after the same function. A being in preparation for Buddhahood was known as a Bodhisattva. He did not attempt to cross the ocean of existence in a boat that would hold one only; he chose a larger vessel that would hold also men and devas. This was one source of the distinction between the early Buddhism of the 'Little Vehicle,' and the developed Buddhism of the 'Great Vehicle.' The literature of the latter school (which first begins to make its appearance in the second century B.C.) presents the Buddha as surrounded by vast multitudes of Bodhisattvas, numerous as 'the sands of nine Ganges.' This change is accompanied by another more significant still. One of the Brahmanical theories of the *Mahā-Purusha* (see above) identified him with the Absolute and the Eternal, and in the new system, accordingly, Buddhism has made terms with metaphysics, and transformed its founder from a man who could be born and die into the Self-Existent and the Everlasting. The phenomenal appearance of the Buddha is then explained as a semblance, after the manner of early Christian Docetism, and the aim of the believer is to become a partaker of the Buddha-nature (cf. 2 Pet. i. 4).

This produced a great philosophical cleavage. The adherents of the 'Little Vehicle' were (in the main) realists of the ordinary type, affirming the existence of time, space, matter, &c., as we know them. Over against this was developed the theory of the Void. In early Buddhism this term was applied to the moral emptiness of the craving for wealth and other forms of enjoyment. But it was made the basis of a philosophical scepticism in which the phenomenal world and the whole inner series of sensations and ideas (the *skandhas*, &c.) were in turn declared unreal. Even the Buddha, the goal, and the path were all involved in this scholastic nihilism, and everything was doubted or denied except the doubt and the denial. This kind of advanced wisdom (*Prajnā pāramitā*) was developed in sūtras of enormous length, in which the moral enthusiasm characteristic of Buddhism is maintained with singular earnestness through vast wastes of arid discussion. It produced a reaction in the direction of idealism. The denial of outward differences led to the assertion of their unity in an abiding substance, which alone could render the successions of change intelligible; until, finally, the distinction between the conditioned mind and the ultimate ground of all thinking issued in the declaration that 'every phenomenon is the manifestation of mind' (*Surangama Samādhi Sūtra*, trans. into Chinese by Kumārajīva, A.D. 384–417; see Beal, *Catena*, 303, cf. *Sarva-Darśana-Saṃgraha*, by Mādhava Āchārya [*floruit* 1331], trans. Cowell and Gough).

Literature: an immense literature has gathered around Buddhism, of which only a small portion need be named here. For translations from the Pāli texts see S. B. E., x, xi, xiii, xvii, xx, xxxv, xxxvi, by MAX MÜLLER, FAUSBÖLL, OLDENBERG, and T. W. RHYS DAVIDS; Dialogues of the Buddha (from the Dīgha Nikāya), trans. Rhys Davids, i (1899); WARREN, Buddhism in Translations, Harvard Oriental Series, iii (1896); NEUMANN, Die Reden Gotamo Buddho's (from the Majjhima Nikāya), i (1896). Expositions of early Buddhism: RHYS DAVIDS, Buddhism, in S.P.C.K. Series 'Non-Christian Religious Systems'; Hibbert Lectures (1881); and American Lectures (1896); OLDENBERG, Buddha (1882, 3rd German ed., 1897); HARDY, Der Buddhismus (1890); COPLESTON, Buddhism Primitive and Present (1892).

Later texts: BURNOUF, Lotus de la Bonne Loi (1852); KERN, Saddharma Pundarīka, in S. B. E., xxi (1884); abstracts in BURNOUF, Introd. à l'Histoire du Bouddhisme Indien (2me éd., 1876); Sanskrit Buddhist Literature of Nepal, by Rajendra Lal Mitra (1882); and BEAL, Catena of Buddhist Scriptures from the Chinese (1871).

While the disciples of both the great schools of Buddhism lived and worked side by side (see Hiouen Tsang's account of the university of Nālanda), an immense diversity of opinion prevailed around them. A long catena of witnesses might be cited, such as the Buddhist poem of the *Lalita Vistara*, the *Harsha Charita* of Bāna in the 7th century A.D., the treatise on India by the Mohammedan traveller Albērūnī in the 11th century, or the conspectus of philosophical systems (*Sarva-Darçana-Sangraha*) by Mādhava Āchārya in the 14th. The last-named work enumerates altogether sixteen schools, including (besides Buddhists and Jains) the Materialists who denied the existence of soul or God, and rejected the whole theory of *karma* and transmigration. These were known under various designations, and in the 14th century A.D. their ideas were fathered on a mythical ogre in the Mahābhārata, named Chārvāka (on the designation *lokāyata* see Rhys Davids, *Dialogues*, i. 166–72). Denying transmigration, they rejected the entire claims of the Brahmans. Matter was the only reality, and sense-perception the only form of knowledge. The pedigree of their textbook was traced back ironically (Macdonell) to Brihaspati, preceptor of the gods, and bitter verses survive, declaring 'There is no heaven, no final liberation, nor any soul in any other world.'

Out of this medley six schools finally acquired recognition as orthodox, or capable of some kind of reconciliation with the authority of the Veda. The modes of thought which they represent are doubtless of great antiquity (Max Müller supposes them to have been formed substantially between the 6th and 3rd centuries B.C.), but in the process through which they have descended to the present age they are embodied in certain *sūtras*, or collections of aphorisms, which sum up their principles in the briefest and most concentrated statements. These sūtras are ascribed to different authors, concerning whom, however, little or nothing is known; and the problems of their date and origin are often in the highest degree intricate and obscure. All the Six Systems—even those originally atheistic (or at least non-theistic) in character—are founded on the doctrine of *karma*, and may be said to have the general object of showing a way out of a world which was regarded as full of suffering. In each there is a necessary contrast between ignorance and knowledge; and all lay stress at the outset on the *pramānas*, the sources and authorities of knowledge. The Materialists admitted but one—sensuous perception; elsewhere inference was added; and the number might be further increased by comparison, presumption, and trustworthy testimony, including revelation.

1 and 2. In the line of Vedic tradition stood the *Mīmāmsā*, 'investigation' or 'inquiry.' The field of inquiry was the meaning of the sacred texts; and it fell into two parts, one prior (*pūrva*), and one posterior (*uttara*). These terms do not imply a time-order, though the subject-matter of the Pūrva-Mīmāmsā must have originated at a very early period (Thibaut). The distinction refers on the one hand to the sphere of sacrificial action displayed in the Brāhmanas, and on the other to the sphere of the knowledge of Brahman exhibited in the 'forest-treatises' attached to the Brāhmanas and the Upanishads.

(1) The sūtras of the Pūrva-Mīmāmsā are concerned with the knowledge of Dharma or religious duty, conceived chiefly from the ritual side. They are attributed to Jaimini, but there is no clue to his place or date. Their main philosophical interest centres (firstly) in the arguments for the uncreated character of the Veda and its existence from all eternity, involving the doctrine of the eternity of sound, and the further view that the connection of a word and its sense is not the result of a convention, but is eternal also, inhering in the word intrinsically, and (secondly) in the discussion of the rewards of duty. In the sequence of duty and reward, did the works produce their fruit directly, without superhuman interference, or were they requited directly or indirectly by the Lord (Max Müller)? The Pūrva-Mīmāmsā taught the first view, and was thus exposed to the charge of atheism.

(2) By far the most important of all the schools (in continuity to the present day) is the other branch of the Mīmāmsā, commonly known as the *Vedânta* (or 'Veda-end,' in the sense of the conclusion of the Veda in the Upanishads, or of the aim or highest object of the Veda). This is founded on the speculations of the earlier Upanishads con-

cerning the identity of the Self (*ātman*) and the Brahman. Its literary form is ascribed to Bādarāyana, of whom, however, nothing is known. The sūtras bearing his name (in 555 short paragraphs) appear to have been open to divergent interpretations, two of which have been preserved in commentaries of the highest rank, one bearing the name of Çankara, A. D. 788–820, the other of Rāmānuja, who flourished about A. D. 1127. (For a discussion of the question which most nearly represents the meaning of the sūtras on which they are based, see Thibaut's Introd. to his translation of the Vedânta Sūtras, *S. B. E.*, xxxiv.) The main problem of the Vedânta was to explain the relation of the soul and the world, as known in our common experience, to the supreme Brahman. In its highest form the Brahman is conceived by Çankara as absolutely homogeneous, pure intelligence or thought, eternal, infinite, indivisible. How then can we account for the appearance of the phenomenal world, with its successions of change, and its plurality of souls? This appearance is, in fact, due to an illusion (*māyā*), the result of our ignorance (*avidyā*). But this ignorance is something more than an individual disability. It is the product of ages, affecting all classes of beings, and has a general cosmic significance. Its origin remains obscure, but in virtue of its universal character Māyā may be regarded as the material cause of the world. This world is perpetually in process of being emitted, maintained, and reabsorbed, by the central energy of the Brahman, who, in this lower view, may be regarded as *Içvara*, or God. Moreover, as 'dreams are true *while they last*' (Tennyson), Çankara allows that 'the entire complex of phenomenal existence is considered as true so long as the knowledge of the Brahman and the Self of all has not arisen, just as the phantoms of a dream are considered to be true until the sleeper wakes.' The highest knowledge discloses the real truth that there is no difference between the Self within and the supreme Self; the influence of Māyā is done away; the believer obtains final release from transmigration, and with death the illusion of individuality is at an end for ever. In this consummation the ethical life, which is an indispensable condition of the higher knowledge, disappears. This is the extremest form of the principle of *advaita*, non-duality or monism. Rāmānuja, who belonged to the Bhāgavatas, a sect of popular monotheism, also affirmed the existence of Brahman as one all-embracing being. But he rejected the distinction between the higher and the lower knowledge, corresponding to the ultimate homogeneous being and the illusory form of Içvara in the world of our experience. For him there was but one Brahman, comprising within himself elements of plurality which shared in his reality. The matter and souls of the universe, which we know, are a kind of body which Brahman everywhere pervades and rules. They are modes of his existence, effects of his energy, passing into different conditions as the world is evolved, sustained, and then again destroyed, but never entirely resolved back into Brahman. The performance of works will not lead the soul beyond the *samsāra*; by the way of knowledge, with the aid of grace, the disciple ascends to the realm of Brahman, and remains there in separate personal existence for ever. This form of *advaita* is known as *viçishta* or 'qualified'; the unity of Brahman is of such a nature that it manifests itself truly in the diversity of matter and spirit.

3. Over against the monism of the Vedânta stands the dualism of the *Sānkhya* ('connected with number,' perhaps originally a nickname of its adherents, 'those numerationists': so Garbe). Its sūtras bear the name of Kapila; but he, too, is an unknown personality; and the actual date of the texts in their existing form is not earlier than about A. D. 1380. Yet the elements of the system may be traced with much probability among the beliefs which early Buddhism denounced; while the oldest literary work of the school, the *Sānkhya-kārikā* of Içvara-Krishna, having been translated into Chinese between A.D. 557 and 583, cannot be later than the 6th century. The main doctrine is the absolute distinction between matter and spirit. On the one hand is *Prakriti*, the primaeval stuff out of which the universe is produced in endless successions of evolution and destruction; on the other a boundless number of *Purushas*, or souls. Eight forms of Prakriti with sixteen modifications, together with Purusha, make up twenty-five *Tattvas* ('thatnesses' or principles), in the complete knowledge of which lies the way to final emancipation from rebirth. The union of soul and matter produces pain, for all conscious life is suffering (see the Four Truths, evidently modelled on the Buddhist summary, quoted by Garbe, *Die Sāṃkhya-Philosophie*, 195, from the *Sānkhya-pravachana-bhāshya*, founded probably on very ancient tradition); and the object of

philosophy is the liberation of the Purusha. The original *Prakriti* is not regarded as homogeneous; it consists of three constituent principles (*gunas*) in equipoise, commonly designated goodness, passion, and darkness. A kind of unconscious impulse (derived from the *karma* accumulated in a previous world-system) in due time disturbs the balance, and leads to the production of a new universe. The undeveloped (*avyakta*) potential matter is first 'illuminated and intellectualized' by the development of a kind of cosmic *Buddhi* or intelligence. This in its turn generates *Ahamkāra* (literally 'I-making'), which involves the consciousness of subject and object, and so on through the elements of the subtle body with its internal organs which passes from life to life in the *sāmsara*, until finally the process ends in the coarser materials forming the world of our experience. Thus in any given individual the whole of the psychic life is regarded as the result of a material evolution, and is independent of the Purusha. The Purusha (whether infinitely little, or infinitely great) is pure spirit, absolute thought; but it is without attributes or qualities, it is unmoved by joy, pain, or other affections (which in any given individual are the products of its organization); it is solely engaged (while the Prakriti is undeveloped) in the 'knowledge of nothing' (Roer). By an obscure tendency to non-distinction (*aviveka*), the Purusha becomes united to a given set of psychic organs, with the result that it fills them with light, and the self-existent soul becomes an empiric *jīva* or personal life. It has thus the function of bringing the temporary condition of the inner organs into consciousness, but it has no will and cannot act, the entire volitional energies being derived from the material side of any particular existence. As all consciousness involves pain, the object of the truly wise is to liberate the Purusha from union with the material substrata which will then disappear, and enable it to return to its changeless independence. This is effected by the knowledge of 'distinction,' the eternal difference between spirit and matter (even in its most attenuated forms). For one thus emancipated, transmigration ceases, and at death the Purusha returns into that timeless unconsciousness of which dreamless sleep and swoon are the faint types on earth. The Sānkhya philosophy thus dispenses with any central unity; it needs no God (*Īçvara*), and is consequently designated an atheistic doctrine (*nirīçvara-vāda*).

4. Connected with this is the *Yoga* of Patanjali, who is often identified with the famous grammarian of that name (about 140–120 B. C.), though this is doubted by others. As the sūtras do not contain any polemical references to other systems, it is sometimes supposed that they were the earliest to take literary form. The Mahābhārata declares him wise who 'sees that the Sānkhya and the Yoga are one.' The Yoga theories of knowledge, cosmology, physiology and psychology, are essentially those of the Sānkhya, and the goal of final deliverance is conceived originally in the same manner (Garbe). The Yoga is in truth a system of practical disciplines for effecting the ultimate release of the Purusha from entangling bondage in matter. The term *yoga* itself ('yoking' or 'joining') has sometimes been interpreted as 'union,' viz. of the soul with God. But in the original sūtras on which the school is founded this is nowhere presented as the supreme end; and *yoga* is generally expounded by the best native and European scholars as 'effort,' 'exertion,' 'concentration.' It is in this sense that it is defined in the first aphorism as the 'suppression of the functions of the thinking-principle (*chitta*).' The Yoga (like the Sānkhya) assumes the existence of countless individual souls. In the evolution of the undeveloped Prakriti, the Sānkhya *buddhi* is represented by *chitta*, which, while intrinsically material and unconscious, becomes conscious through association with the Purusha. But, as in the Sānkhyan scheme, the Purusha is purely passive, and only serves as an illuminator of the processes carried on by the inner organs, which are themselves the products of a quasi-mechanical development. The purpose of the Yoga is the attainment of the knowledge which will break the bonds entangling the Purusha in the world of sense. It expounds the obstacles (such as causes of distraction, disease, languor, doubt, carelessness, &c.) which must be surmounted by concentration, cheerfulness, benevolence, compassion, and other modes of mental and moral energy. It lays stress on suitable practices of meditation, prescribes the regulation of the breath and appropriate postures (capable of being carried to terrible ascetic extremes), enumerates various occult powers which will be gained upon the way, and lays out seven stages marking the final realization of the liberating knowledge. In perfect emancipation (*kaivalya*) the Purusha is free alike from the works and sufferings of self-consciousness, and

abides eternally in undisturbed repose. On to this system was grafted a partial theism (derived perhaps from the Bhāgavatas), by which one Purusha was recognized as 'untouched by afflictions, works, deserts, and desires.' To this Purusha, which was not entangled in the cosmic process, the name Içvara was given (so that the Yoga became a *sa-Içvara* or *seçvara-vāda*). By this means Patanjali's scheme escaped the reproach of atheism; but the divine Purusha was only differenced from the rest by remaining apart, outside of time, while the remainder were involved in the successions of change. Devotion to him might aid the progress of the believer who 'made over all his actions to him'; but he had no part in the world of our experience, nor had the victorious disciple any necessary relation to him. Mitra, therefore, seems right in affirming that the theistic doctrine was in no way homogeneous or consistent with the Sānkhyan elements with which it was associated.

5 and 6. Two other systems appear in close alliance, the *Vaiçeshika* or 'philosophy of discrimination,' and the *Nyāya* or system of reasoning or 'logic.' They possess much common matter, both in terminology and doctrine. They start from the same four sources of knowledge (*pramānas*), sensuous perception, inference, comparison, and 'word' in the sense of trustworthy testimony, including a guarded recognition of revelation in the Veda. They have a similar psychology and metaphysic, and they propose to the student the same goal in the liberation of the soul from the pain consequent on rebirth. They doubtless represent philosophical inquiries starting at an early date, and seem to be branches of a common endeavour to arrange all knowable things under certain heads, and lay down methods of acquiring knowledge. Of their reputed founders, Kanāda (or Kanabhuj, 'atom-eater') and Gotama, nothing is known; their sūtras appear to have been studied by the Jains in the 6th century A.D., but they are probably of much greater antiquity (Garbe thinks the Vaiçeshika the older). The aim of the *Vaiçeshika* is deliverance from the suffering of transmigration, which is to be attained by perception of the real nature of the soul. This depends on a knowledge of the truth summed up in the six Categories. Such knowledge in its turn is to be acquired by *dharma* or 'duty,' conceived as forbearance from works in themselves evil, or from others undertaken with a view to winning transitory fruits of happiness. The philosophical interest of the system lies in its attempt to include the objects of knowledge in six *Padârthas* ('word-things'), substance, quality, action, genus or community (what constitutes a genus), species or particularity (what constitutes an individual), and co-inherence or inseparability. To this some added 'not-being' or negation, and yet others, power or energy and resemblance. Under substance were enumerated the four elements—earth, water, light, and air—together with ether, time, space, soul, and *manas* (mind), the inner organ through which the soul acquired knowledge of the external world. The four elements were all constituted out of atoms, eternal and unalterable, in various combinations; and not only was the soul eternal, but (contrary to the Sānkhyan psychology) the *manas* also was regarded as an atom and eternal. Any given world-system was formed by the *adrishta*, the 'unseen,' the effects of *karma* in a previous world. Içvara is not named in Kanāda's sūtras, though some commentators find it implied in sūtra 3.

6. The *Nyāya* (lit. 'going back,' reference, and then logical argument, syllogism) likewise offers a scheme of saving knowledge. Final beatitude arises from proper comprehension of the truth, as summarized in the sixteen *Padârthas*. Only its lower form, however, is attainable in this life, where the fruits of past action may still affect the body, though they can no longer disturb the indifference of the soul. The higher, with its complete deliverance from the liability to pain consequent on rebirth, can be reached only through death. This is the usual opening in connection with the recognized orthodox theory. The real stress of the system lies in its analysis of the methods of thinking. This is effected in discussing the second *pramāna*, 'inference' (the four *pramānas* constitute the first and the seventh *padârtha*, 'premises'). Under the latter head the structure of the syllogism is expounded. This is arranged in five members (the terminology varies in the later Vaiçeshika schools), including (1) The Proposition or Assertion, 'this hill is fiery'; (2) The Reason, 'for it smokes'; (3) The Instance (of the general rule), 'what smokes is fiery, as a kitchen hearth'; (4) The Application, 'accordingly, the hill is smoking'; (5) The Conclusion, 'therefore it is fiery.' The 'general rule' or 'universal proposition' is to be tested by affirmative and negative induc-

tion, which may be based on similar instances, or dissimilar, as in the following arguments against the Mīmāmsan doctrine of the eternity of sound: '(1) Sound is non-eternal; (2) Because it is produced; (3) Whatever is produced is non-eternal, as pots, &c.; (4) Sound is thus produced; (5) Therefore it is non-eternal: or (1) Sound is non-eternal; (2) Because it is produced; (3) Whatever is unproduced is eternal, as soul, &c.; (4) But sound is not thus unproduced; (5) Therefore it is non-eternal' (quoted by Cowell in Colebrooke's *Essays*, i. 315). Other topics are also discussed, such as the *reductio ad absurdum*, and various forms of fallacy and wrong argumentation. Some of these are included among the sixteen *padârthas*, which are not arranged (as in the Vaiçeshika) to include all objects of knowledge. These are expounded under the sub-heading *prameya* (what is measurable, and so ascertainable or demonstrable), constituting the second *padârtha* (the four *pramânas* being the first). Here are ranged the Self or Soul, body, the senses, understanding (*buddhi*), mind (*manas*), the inner organ which transforms sensations into perceptions, will, and all that concerns transmigration, up to final beatitude. The soul is infinite and eternal, and among their boundless plurality the later Nyāya exalted a Supreme Soul (*Paramâtman*) as the seat of eternal knowledge, who created and maintained the universe ('the earth must have had a maker, because it is an effect like a jar'; 'the world depends upon some being who wills to hinder it from falling': see the *Kusumānjali* of Udayanâchārya, about 1200 A. D., tr. Cowell, 1864).

Various forms of eclecticism are represented by the *Svetâsvatara Upanishad*, the famous *Bhagavad-Gītā*, and other works (see the *Sarva-Darçana-Sangraha*) connected with the cults of Vishnu and Çiva. But these did not acquire permanent recognition. At the present day various influences have produced a revival of Vedântism, which is being actively promoted by Swāmi Vivekânanda and others, and is represented by a monthly organ entitled the *Brahmavādin*.

Literature: Texts of the Six Systems with translations printed for the use of the Benares College by Ballantyne (1850–53); Fitz-Edward Hall, Contrib. towards an Index to the Bibliog. of the Indian Philos. Syst. (Calcutta, 1851); Sarva-Darśana-Saṃgraha of Mādhava Āchārya (trans. Cowell and Gough, 2nd ed., 1894); Colebrooke's Essays (ed. Cowell), I. vii–xi; Monier-Williams, Indian Wisdom, iii–vii; Garbe, Philos. of Ancient India (1897); Max Müller, Six Syst. of Indian Philos. (1899); Macdonell, Sansk. Lit., xv (1900), the last-named containing a list of the latest works of Germany and India, p. 451.

V. **China.** The state-religion of China is founded on traditions of high antiquity, embodied in the five classical books: (1) The *Yi King*, or 'book of Changes' or 'Transformations'; (2) The *Shu King*, a collection of quasi-historical memorials down to the reign of Hsiang (651–619 B. C.); (3) The *Shih King*, a collection of upwards of 300 odes, down to the reign of Ting, 606–586 B. C., which Confucius is supposed to have rearranged; (4) The *Chun Tsew*, a chronicle of the kingdom of Lu, 721–480 B. C., ascribed to Confucius; (5) The *Li Ki*, or 'book of Rites,' dating in its present form only from about the commencement of our era, but containing much older materials. The religion here delineated is a kind of ethicized animism, regulated by the two chief conceptions Heaven and Earth. Besides the spirits of the dead, vast numbers of spirits are grouped under the two great living powers which sum up the world. To the lower belong the spirits of the regions, lakes, rivers, mountains, grains, &c.; while in the upper realm are the spirits of the winds, clouds, rain, thunder, and the like. Some traces exist of a view of heaven and earth as the father and mother of all things; and in the *Yi King* many scholars have found the symbols of cosmogonic speculations concerning the production of all things from the male (heaven) and female (earth) principles Yang and Yin (also identified with the 'bright' and the 'dark'), but this is rejected by Legge (*S. B. E.*, xvi. 43), who points out that these terms occur in an appendix, and further ascribes to them another interpretation. At the head of all is the animated sky, Tien (or Chien), the actual expanse of heaven conceived as living (cf. the significant answer to modern objections reported by Edkins, *Religion in China*, 1884, 95). Vastness and unity are its attributes, its written character being compounded of the symbols for 'great' and 'one.' Heaven and Earth, as the parents of all creatures, act in harmony, with a steadfast energy. This 'order' is their decree or rule, and it is especially seen in the procedure of the sun and moon, the vicissitudes of the seasons, and (more generally) the regular course of nature. Power and action

lie with Tien, which maintains harmony in the universe, and founds upon it the moral order of society. The 'sincerity' of Tien is the basis of all right action; it is without respect of persons, and its impartiality supplies the type of all just rule. The moral attributes of Tien seem occasionally to transcend the conception of the living sky, which is personalized under the title *Shang Ti*, 'supreme ruler.' Applied in the state to the emperor, this name becomes, in relation to the universe, equivalent to God. His relation to Tien is not defined in the texts—the Odes use now one term, now another—but the *Li Ki* describes Shang Ti as 'dwelling in the great heaven'; and a whole series of commentators and philosophers afterwards asserted over and over again that Ti is present in the sky (or in the world) as the mind is in the body: 'Heaven and Earth are one material creation, just as the various bones make up the body of a man. Shang Ti is the lord and governor of heaven, and it is not possible that there should be two lords and governors' (cf. Legge, *Notions of the Chinese concerning God*, Hong Kong, 1852).

This conception of the order of nature as the root of personal and social morality is prominent in the teaching of two of the most famous Chinese sages, Confucius, and his elder contemporary Lao Tsze. Confucius (as the early Jesuit missionaries Latinized his native name) was born in 551 B.C., in the modern province of Shan-tung. Zealous as a student, he acquired administrative experience as keeper of grain-stores and superintendent of public lands, and also began teaching about 530. The empire was in a state of political confusion, owing to the weakness of the central power and its inability to control the dependent principalities, and Confucius suffered from the jealousy of ministers of other states. For a considerable period (515–501) he devoted himself to literary work and to teaching, but he accepted office in his native state of Lu in 500, and finally became minister of crime. Brigandage was suppressed, the fortresses of the great families dismantled, and morals generally reformed. After a short time, however, the prince of an adjoining state succeeded in alienating the confidence of the prince of Lu from his minister, and Confucius went forth as an exile, wandering for thirteen years (496–483), accompanied by a little band of disciples, often in want and danger, but sustained by the conviction that 'Heaven would not let the cause of truth perish.' His last years were saddened by the deaths of his wife, his only son, and two of his favourite disciples: he himself died in 478 B.C. Confucius accepted the general principles of doctrine and ritual set forth in the *Kings*; but he used the title Shang Ti only with reserve, and tended to revert to the conception of Heaven as the source of power and symbol of order rather than as a personal being. He dwelt on the ceaselessness and simplicity of the productive energies of Heaven and Earth, and on their freedom from any private interests. He interpreted their silent order as a real revelation of Heaven, and affirmed that Heaven's decrees (*ming*) were to be gathered out of the events of life. The stress of the Confucian teaching fell on a kind of ethical naturalism, based on the principle of order displayed in the regularity of the world, and reflected in the constitution of man and the proper harmony of society. (1) Personally, man is born for uprightness; his nature is a gift from Heaven, every faculty and relationship having its proper law annexed; virtue consists in being true to this nature. Thus, the aim of the mind is truth, and of the character righteousness; virtue, therefore, needs no sanctions to enforce it, but is to be pursued for its own sake. Practically, however, human nature varies in its knowledge of duty, and its ability to fulfil it. Careful self-culture is therefore needed; special stress being laid on the control of thought and rectification of the heart. This alone secures full development of the individual nature (based on knowledge and virtue), which is thus enabled to provide for the proper development of other natures (animals, &c.), until the perfect man steps in to assist the transforming and nourishing powers of Heaven and Earth, and forms a 'ternion' with them. Thus man is brought into union with the forces outside him, which he learns to apply in accordance with their laws; and when the forces within him act in harmony, perfect order prevails (see the *Chung Yung*). (2) Man is further related to other men, and in the social state (whether tribe or empire) the true unit is the family. Here he enters into five relations (sovereign and minister, husband and wife, father and son, &c.), the duties of which must be performed with the three virtues of knowledge, magnanimity, and energy. The requirements of duty in these relations are made known by the principles of the 'not-I,' 'reciprocity,' and the 'measuring

square' (*Analects*, V. xi, XV. xxiii; *Ta Hio*, x; *Chung Yung*, xiii), 'what you do not want done to yourself, do not to others.' This rule is stated by Confucius in a negative form, but many of his precepts show that its positive significance was also familiar to him. The political philosophy of Confucius did not get beyond the conception of the state as a vast family. The sixth of the nine standard rules prescribed for the emperor required him to deal with the mass of the people as a father with children. The administrative hierarchy must imitate his example; and then the people themselves would follow it. Filial piety has ever since remained a prominent feature in the Chinese ideal; and when Buddhism established its monasteries in the midst of the followers of Confucius, it was again and again bitterly denounced for the disturbance which it introduced into family relations.

The practical ethics of Confucius did not pass unchallenged into the position of eminence which his teaching subsequently acquired. His doctrine was assailed from opposite sides by Yang Chu and Mih Teih (or Mi Tsze). The first-named paraded pleasure as the only good, conceived in the coarsest forms of sensual gratification. He contrasted the careers of the typical sages and the typical villains of antiquity; the laborious years passed by the former were in no way compensated by a posthumous fame which they could not feel; while the evil repute of folly or tyranny did no harm to the latter, who had enjoyed themselves recklessly at the expense of others. The satisfaction of desire, therefore, was the sole end of life, and in the disorders of contemporary society the strong who preyed upon the weak were justified. To Mih Teih this conclusion was unendurable. Why did thieves steal, and great officers throw each other's families into confusion, and one state make war upon another? There was one cause for all—the want of mutual love. If fathers and sons, rulers and ministers, were kind and filial, distress and confusion would disappear. Reciprocal affection is the guarantee of order, while the root of trouble lies in aversion and mistrust. The remedy for social ills therefore was obvious: 'it is needful,' said Mih Teih, 'to awaken in the heart the love of men.' From these two antagonistic principles, known as 'each for himself,' and 'loving all equally,' or 'universal love,' ethical speculation was recalled by Meng Tsze ('the philosopher Meng,' whose name was latinized as Mencius), 372–289 B.C., into the more sober ways of Confucian morality. Mencius affirmed, like his predecessor, that the tendencies of man's nature are towards righteousness; but he distinguished a number of various impulses to action which were not all of equal rank, some being stamped with the nobility of heaven, and others rooted in the 'passion-nature' which pervades the physical organism. This 'passion-nature' it was the business of the will to subdue, so as to secure a due control. The general resemblance between the moral philosophy of Mencius and that of Butler has been pointed out by Legge; the Chinese sage, however, devoted more attention to elementary politics and the conditions of social well-being, asserting that 'the people are the most important element in the country; . . . and the ruler is the lightest.' From the time of Mencius the influence of the Confucian teaching steadily grew. The attempt of She Hwang-ti in 213 B.C. to destroy the ancient literary records was baffled by the devotion of the *literati*; and, under the Han dynasty which followed, the study of the text was pursued with extraordinary assiduity. On the introduction of the system of competitive examination, in A.D. 631, the nine Confucian classics were made the sole subjects of the new test for the public service, and they remain so to this day.

Beside the ancient state-religion of China stands the cult which European scholars designate Taoism. In its modern form, degraded by alliance with divination and magic, it has little connection with the profound conception from which it takes its name. The *Tao* was the watchword of an elder contemporary of Confucius, Lao Tsze ('the old philosopher'), whose birth is commonly placed about 604 B.C. The records of him are of the scantiest, and the authenticity of the little book of aphorisms known as the *Tao Teh King*, still defended by Legge, must be regarded as doubtful (Giles), though it contains many genuine sayings; but enough traces survive in Chinese literature, and especially in the writings of his disciple Chwang Tsze (contemporary with Mencius, about 300 B.C.), to indicate the presence of a powerful mind, whose thoughts have rather the character of philosophical intuitions than of reasoned and methodical system. The term round which his doctrine gathers, the *Tao*, was not new in Chinese usage. Its common meaning was 'way,' path, road, or course. The 'great Tao' was the high-road, contrasted with side lanes.

It was applied figuratively in the older literature to the course of nature, and also to the path of right conduct. The Tao of heaven denoted the sum of the actions and energies of the all-embracing sky; the Tao of the earth expressed the totality of the potencies and operations of the ground. Heaven and earth, however, could be named and described; the objects they contain could be classified; they could not—in their visible order—be the ultimate reality. Therefore the Tao that can be trodden is not the enduring and unchanging Tao; the originator of heaven and earth is beyond our apprehension, and consequently 'nameless'; but it works silently, fulfilling its own law, everywhere uniform and constant, producing, nourishing, maturing everything. It cannot be called conscious or unconscious, for it includes both; nor personal or impersonal, for it transcends both; in it are contraries reconciled, and the beam and the pillar (the horizontal and the perpendicular) are identical. The Tao is thus a kind of *natura naturans*; but with the practical aim which was never far distant from a Chinese thinker the Tao becomes at once a moral type. Heaven and earth do not interfere with the things they have begotten; they give each object opportunity to fulfil itself, and remain silent, acting yet not seeming to act. Man also must follow the Tao. In nature is unity, harmony, repose; the wise man must have no personal ends, he must avoid self-display, and cultivate humility. In the hands of Chwang Tsze this principle approaches very closely to a philosophy of the unconscious, as in the parable of the sword-maker who, by constant practice, came to be able to do the work without any thought of what he was doing, or in the question of Lao Tsze to a would-be disciple, 'Can you become as a little child?' In one of the imaginary colloquies in which Chwang Tsze expounds his master's teaching, Confucius is represented as summing up the Classics in two words, 'Benevolence and righteousness.' 'What do you mean by them?' asks the elder sage. 'To be in one's inmost heart in kindly sympathy with all things; to love all men; and to allow no selfish thoughts.' But Lao Tsze objects, 'To be seeking to allow no selfish thoughts—that is selfishness' ('your elimination of self is a positive manifestation of self,' Giles), and he points to heaven and earth, which unfailingly pursue their course of impartial good will. Finally, government must be conducted, according to the Tao, without boastful display. A great burst of reforming zeal, fresh enactments, increased command of material resources, the spread of luxury, the burdensome taxation which followed on the ruler's extravagance, were all alike contrary to the Tao. The ideal was to be found in a little state, which could be governed by the 'quiet and unexciting method of non-action': but this involved keeping the people without knowledge or desire, for it is 'garrulity of speech which puts the world in disorder.' When, however, an emperor inquired, 'If the empire is not to be governed, how are men's hearts to be kept in order?' Lao Tsze bade him 'be careful not to interfere with the natural goodness of the heart of man.' 'The empire is a divine trust, and may not be ruled. He who rules, ruins. He who holds by force, loses.' 'Mighty is he who conquers himself.' 'To the good I would be good, to the not-good I would also be good in order to make them good.' 'Use the light that is in you to revert to your natural clearness of sight.' The best government, therefore, rests on a philosophical quietism, conserves existing institutions, and administers them on the principle of non-interference.

The attempts of different scholars to connect Lao Tsze's ontological speculations with Indian thought (e.g. Douglas, 1880, in contradiction to his former opinion, 1879; de Harlez, 1891) do not seem successful. But the introduction of Buddhism in the first century A.D. opened the way for an infusion of Hindu metaphysics (see *ante*, p. 233). Enormous labour was bestowed on the translation of Sanskrit works; and this in due time produced a revival of ancient cosmogonic and other speculations based on the texts. Thus in the 11th century Chow Tsze (1017–73) wrote a treatise on the 'Diagram of the Great Origin,' a secret doctrine supposed to be implied in the *Yi King*; and a hundred years after Chu Hi (1130–1200), who had devoted himself to the study of Buddhism and Taoism, reverted to the classical texts under the influence of his predecessor, and expounded a monistic philosophy on the basis of the 'Great Origin.' Of these works Mayer says, 'His commentaries on the classical writings have formed for centuries the recognized standard of orthodoxy, but within the last hundred and fifty years critics have arisen who have vigorously impugned the doctrines of his school.'

Literature: Texts and translations in Legge's Chinese Classics, 5 vols. in 8 parts

(1861–93); translations in S. B. E., iii, xvi, xxvii, xxviii. On the religions of China: PLATH, Religion und Cultus der alten Chinesen (Munich, 1862); JOHNSON, Oriental Religions: China (Boston, 1877); LEGGE, Religions of China (1880); RÉVILLE, La Religion Chinoise (1889); DE HARLEZ, Les Religions de la Chine (1891); BUCKLEY, in Chantepie de la Saussaye's Religionsgeschichte (2nd ed., 1897); (the three vols. of the Religious System of China by DE GROOT, 1892–7, deal only with the disposal of the dead). Special: Confucius, by PLATH (1867–74); FABER, Lehrbegriff des Confucius (1872), and Quellen zu Confucius (1873); GABELENTZ, Confucius und seine Lehre (1888); DOUGLAS, Confucianism and Taoism (1879 and 1889); other translations by PLÄNCKNER (1875, 1878); VICTOR VON STRAUSS (1880), &c. On Taoism: Tao Te King, le Livre de la Voie et de la Vertu, trans. JULIEN (Paris, 1842); also by PLÄNCKNER (1870) and by V. VON STRAUSS (1870); Taoist texts: trans. LEGGE in S. B. E., xxxix, xl; GILES, Chwang Tzŭ (1889); DE ROSNY, Le Taoisme (1892); Mencius, see LEGGE'S Classics, and Mih Tsze, trans. DE HARLEZ in Giornale della Società Asiatica Italiana, viii (1894) and ix (1895–6). Cf. MAYER, Chinese Reader's Manual (1874); CARUS, Chinese Philosophy (Chicago, 1898).

On Philosophy in Japan cf. a paper by TETSUJIRO INOUYÉ, of Tokio, at the Congress of Orientalists (Paris, 1897), and published in the Japanese magazine Hansei Zasshi. A curious glimpse into the subjective idealism of the Buddhist sect founded by Nichiren (born in 1222 A.D.) is afforded by the essay of Abbot KOBAYASHI NITTO, The Doctrines of Nichiren (Tokyo, 1893): 'All phenomena, mental and material, in all times and spaces, are to be conceived of as existing subjectively in the consciousness of every individual, as his own physical and mental states, and thus only' (p. 8). (J.E.C.)

Orientation (bodily) [Lat. *orientare*, to set up with regard to the cardinal points, especially the east]: Ger. *Orientirung*; Fr. *orientation*; Ital. *orientazione*. (1) The maintenance of the normal position and spacial relationships of the body, as a whole, with reference to its surroundings. A better term for this meaning is equilibrium.

(2) The undisturbed consciousness of the spacial relationships of the body, as a whole, to its surroundings. (J.M.B.)

The orientation of the organism in space is conditioned psychologically by a number of sense and reflex factors, by sensations of vision, by sensations from skin, joints, muscles of limbs and trunk, muscles of eyes, by the visual and tactual reflexes, and by the sensory and reflex mechanism of the STATIC SENSE (q.v.). (E.B.T.)

While accomplished by a fused mass of these sensations orientation becomes largely reflex, and only intrudes itself into consciousness when disturbed, as when one is very sleepy or under the influence of drugs. The balancing of the head, for example, is quite subconscious; yet when we nod, we discover certain elements of sensation, e.g. from the muscles co-ordinated with those of vision by which the normal head position is maintained. This head-balancing is gradually acquired by the child, as is also the erect position of the whole body, through association, together with natural reflexes. The influence of vision, normal and under artificial conditions, has been investigated experimentally by Stratton (*Psychol. Rev.*, iv., 1897, 341, 463). (J.M.B.)

Orientation (mental). The normal ability to recognize one's surroundings and the personal and social relations of the environment.

In mental disorders this power is frequently lost; the patient no longer recognizes or realizes his condition, his whereabouts, or his departure from his usual life. This condition is marked in insanities accompanied by hallucinations and systematic delusions. It is also characteristic of delirium, and of various forms of intoxication. (J.J.)

Orientation (illusions of): Ger. *Orientirungstäuschung*; Fr. *renversement de l'orientation* (Binet); Ital. *illusione dell' orientazione*. Disturbance of the normal consciousness of direction, especially as involving the shifting of the points of the compass in a way which shifts the entire physical environment with reference to the observer, but does not disturb the spacial relationships of objects to one another.

The term illusions of orientation was suggested by the translator of Binet's standard paper on the subject (*Psychol. Rev.*, i). Such shifting of the physical world is usually either 180° or 90° exactly; rarely between them or under 90°. Information does not usually dispel the illusion, which persists as a consistent scheme of directions, even after the true scheme is reinstated. For details, cases, and literature, see the paper by Binet, cited above. (J.M.B.)

Orientation (law of constant) [Ger. *Gesetz* (or *Prinzip*) *der constanten Orientirung*; Fr. *loi d'orientation constante*; Ital. *legge di orien-*

tazione costante. This law declares that the orientation of the eye is constant for every recurrent position of the line of sight, no matter by what road the line (or the eye) has travelled. It was formulated by Donders in 1847: see DONDERS' LAW.

Literature: HELMHOLTZ, Physiol. Optik (2nd ed.), 619, 638; HERING, Beitr. z. Physiol., 248; WUNDT, Physiol. Psychol. (4th ed.), ii. 119. (E.B.T.)

Origen, surnamed **Adamantios.** (185–254 A.D.) His early education was at the hands of his father, Leonides, and Clemens Alexandrinus. At his father's martyrdom, Origen opened a school. He was made master of the catechetical school of Alexandria by Bishop Demetrius. Studied philosophy (under Ammonius Saccas) and Hebrew (upon a visit to Rome). Called to Greece (228) to dispute a heresy, and was made a presbyter at Caesarea. This ordination Bishop Demetrius refused to recognize. Excommunicated, 231, he opened his school in Caesarea with still greater success than before. See ALEXANDRIAN SCHOOL, and PATRISTIC PHILOSOPHY (5).

Origin: see GENESIS.

Origin of Evil: see equivalents for EVIL, under that term. A phrase used in discussions of the genesis and nature of EVIL (q. v.) in its various meanings, especially ethical evil.

The term THEODICY (q. v.) has come into use to include this problem in a larger one, more especially when treated from a theistic and apologetic point of view. A preliminary problem is necessarily that of the definition and classification of evils, and much of the discussion is vitiated by lack of clearness on this point. See EVIL.

Literature: the Book of Job, and the literature pertaining to Job, of which a late discussion is by ROYCE, Studies in Good and Evil. A different metaphysical standpoint is represented by ORMOND, Basal Concepts in Philosophy. For more theological treatment see the general works cited under THEOLOGY. As a problem of the philosophy of RELIGION (q. v.), it is treated in most of the literature there cited. See also THEODICY, especially the work of LEIBNITZ. (J.M.B.)

Origin of Life: Ger. *Ursprung des Lebens*; Fr. *origine de la vie*; Ital. *origine della vita.* The source of the first living organism upon the earth.

The attempt to prove spontaneous generation having failed, other theories have been advanced. It was suggested by H. E. Richter (1865), and later by Helmholtz and Lord Kelvin, that micro-organisms might reach the earth upon meteorites. There are no direct observations to support this suggestion, which does not explain the origin of life, but merely puts it one stage further off. (C.S.M.)

At the present time life is known only in organisms of complex structure and chemical constitution, and always accompanied by the presence of a substance called protoplasm, to the activities of which all vital phenomena are due. Since the crude theory of the spontaneous generation of such organisms has been disposed of, there remains only, as a scientific explanation, the theory of their gradual evolution from inorganic lifeless elements, at a time when the earth had cooled sufficiently to allow the necessary chemical combinations to take place. The determination of the series of increasingly complex bodies, which must have formed links in the long chain of development leading up to the formation of the proteids of which living protoplasm now consists, has been attempted by many observers, and not entirely without success. Amongst these may be especially mentioned Pflüger. Cf. LIFE, LIVING MATTER, PROTOPLASM, and VITALISM.

Literature: E. PFLÜGER, Pflüger's Arch. (1875); T. H. HUXLEY, The Physical Basis of Life (1868), and Collected Essays; M. VERWORN, Gen. Physiol. (1899). (E.S.G.)

Origin of Species: Ger. *Ursprung der Arten*; Fr. *origine des espèces*; Ital. *origine delle specie.* Theory of the rise of diversities in the forms of animal life of sufficient magnitude to constitute different SPECIES (q.v.).

The phrase has been classic since the appearance of Darwin's *Origin of Species by Means of Natural Selection.* The two great rival theories are SPECIAL CREATION and EVOLUTION; see those topics. The corresponding 'classics' of the special creation theory are the *Book of Genesis* and its poetical exposition in Milton's *Paradise Lost.* Also see FACTORS OF EVOLUTION, DESCENT, HEREDITY, TELEOLOGY, and NATURAL SELECTION. (J.M.B., E.B.P.)

Origin *versus* Nature: no concise foreign equivalents. A phrase used to indicate the question whether a complete account of the origin of a thing would also be a complete account of its nature.

The inquiry is often made under the terms 'origin versus reality,' or, in an expression a little more sharp in its epistemological meaning, 'origin versus validity.' 'Origin versus nature' seems to mark better the general distinction between the 'how' of the question—how a

thing arose or came to be what it is; and the 'what' of the question—what a thing is.

The problem is brought to the fore by the current view that the nature—'the what'—of a thing is given in, and only in, its behaviour, i. e. in the processes or changes through which it passes. The more we know of behaviour of a certain kind, then the more we know of reality, or of the reality, at least, which that kind of behaviour is. And it is evident that we may know more of behaviour in two ways. We may know more of behaviour because we take in more of it at once; this depends on the basis of knowledge we already have—the relative advance of science in description, explanation, &c., upon which our interpretation of the behaviour before us rests. In the behaviour of a bird which flits before him, a child sees only a bright object in motion; that is the 'thing' to him. But when the bird flits before a naturalist, he sees a thing whose behaviour exhausts about all that is known of the natural sciences.

When we come further, on this view, to approach a new thing, we endeavour, in order to know what it is, to find out what it is doing, or what it can do in any artificial circumstances which we may devise. Just so far as it does nothing, or so far as we are unable to get it to do anything, just so far we confess ignorance of what it is. We can neither summon to the understanding of it what we have found out about the behaviour of other things, nor can we make a new class of realities or things to put it in. All analysis is, therefore, just the finding out of the different centres of behaviour which a whole given outburst of reality includes.

Yet there is a second aspect of a thing's reality which is just as important. Behaviour means, in some way, change. A mere lump would remain a lump, and never become a thing, if, to adhere to our phenomenal way of speaking, it did not pass through a series of changes. A thing must have a career; and the length of its career is of immediate interest. We get to know the thing not only by the amount of its behaviour, secured by examining a cross-section, so to speak, but also by the increase in the number of these sections which we are able to secure. The successive stages of behaviour are necessary in order really to see what the behaviour is. This fact underlies the whole series of determinations which ordinarily characterize things, such as cause, change, growth, development, &c., and which are denoted by the terms 'dynamic,' 'genetic,' &c.

The strict adherence to the definition of a thing in terms of behaviour, therefore, would seem to require that we should wait for the changes in any case to go through a part at least of their progress—for the career to be unrolled, that is, at least in part. Immediate description gives, so far as it is truly immediate, no science, no real thing with any richness of content; it gives merely the snap-object of the child. And if this is true of science, of every-day knowledge of things, which we live by, how much more of the complete knowledge of things desiderated by philosophy as an answer to the question, What? It would be an interesting task to show that each general aspect of the 'what' in nature has arisen upon just such an interpretation of the salient aspects presented in the career of individual things.

A second point in regard to the 'what,' therefore, is that any 'what' whatever is in large measure made up of judgments based upon experiences of the 'how.' The fundamental concepts of philosophy reflect these categories of origin, both in their application to individuals—to 'mere things'—and also in the interpretation which they have a right to claim; for they are our mental ways of dealing with what is 'mere' on one hand and of reaching the final reading of reality which philosophy makes its method. Of course the question may be asked: How far origin? That is, how far back in the career of the thing is it necessary to go to call the halting-place 'origin'? This we may well return to lower down; the point here is that origin is always a reading of part of the very career which is the content of the concept of the nature of the thing.

Coming now closer to particular instances of the 'what,' and selecting the most refractory case that there is in the world, let us ask these questions concerning the *mind*. This case may be taken because, in the first place, it is the urgently pressing case; and, second, because it is the case in which there seems to be, if anywhere, a gaping distinction between the 'what' and the 'how.' Modern evolution claims to discuss the 'how' only, not to concern itself with the 'what'; or, again, it claims to solve the 'what' entirely by its theory of the 'how.' To these claims, what shall we say in the case of mind?

From the point of view given above, it would seem that the nature of mind is its

behaviour generalized; and, further, that this generalization necessarily implicates more or less of the history of mind; that is, more or less of the career which discloses the 'how' of mind. But a striking fact comes up immediately, when we begin to consider mental, and with it biological, reality—the fact of growth, or, to put it on its widest footing, the fact of *organization*. The changes in the external world which constitute the career of a thing, and so show forth its claim to be considered a thing, fall under some very wide generalizations, such as those of chemistry, mechanics, &c.; and when the examination of the thing's behaviour has secured its description under these principles in a pretty exhaustive way, we say the thing is understood. But the things of life, and the series of so-called organic changes which unroll its career, are not yet so broadly statable. When we come to mind, again, we find, indeed, certain well made out generalizations of its behaviour. But here, as in the case of life, the men who know most have not a shadow of the complacency with which the physicist and the chemist categorize their material. It is for this reason, no doubt, in part, that the difference between the two cases gets its emphasis, and the antithesis between origin and nature seems so necessary in one case, while it is seldom raised in the other. For who ever heard a student of natural science say that the resolution of a chemical compound into its elements, thus demonstrating the components and the law of the origin of the 'thing' analysed, did not solve the question of its nature, so far as science can state a solution of that question?

But we cannot say that the whole difference is one of greater modesty on the part of the psychologists. The facts rather account for their modesty. And the prime fact is one formulated in more or less obscurity by many men, beginning with Aristotle: the fact, namely, that organization, considered as itself a category of reality, never reaches universal statement in experience. To confine the case at first to vital phenomena, we may say that to subsume a plant or animal under the category of organization is to make it at once to a degree an unknown quantity, an X: a form of reality which, by right of this very subsumption, predicts for itself a phase of behaviour as yet unaccomplished—gives a prophecy of further career, but gives no prophecy (apart from other information which we may have) of the nature of this further phase of career, in kind. Every vital organization has part of its career yet to run. If it has no further career yet to run, it is no longer an organization: it is then dead. Its reality is then exhausted by the predication of the categories of chemistry, mechanics, &c.—the sciences which construe all careers *retrospectively*. A factor of the biological and mental categories alike is, on the contrary, just this element of what the present writer has elsewhere called the 'Prospective Reference' (*Ment. Devel. in the Child and the Race*, chaps. vii, xi).

It does not matter how the content in any particular filling up of the category may be construed after it takes on the form of accomplished fact — after, i.e., it becomes a matter of 'retrospection.' All constructions in terms of content mean the substitution of the retrospective categories for those of 'prospection'; that is, it is the construction of an organization after it is dead, or—what amounts to the same thing—by analogy with other organizations which have run down, or have died, in our experience. Suppose, for example, we take the construction of the category of accommodation, in each particular instance of it, in terms of the law of FUNCTIONAL SELECTION (q.v.), and so get a statement of how an organism actually acquires any one of the special adaptations of its mature personal life; what, then, have we done? It seems evident that we have simply resorted to the 'retrospective' reference; we have changed our category in the attempt to get a concrete filling for a particular event; we are interpreting it *as already having happened*. To adopt the view that the category of organization can be in every case filled up with matter in this way, does not in any sense destroy the prospective element in the category of organization; for the psychological subtlety still remains in mind in the doing of it, either that the event must still be awaited to determine the outcome, and that I am agreeing with myself and my scientific friends to wait for it, or that we are solving this case by others for which some one has waited. A good instance of our mental subtleties in such cases is seen in the way we use the category of POTENTIALITY (q.v.). The extreme case of the reduction of the categories of prospective reference to those of retrospection is evidently the formula for PROBABILITY (q.v.). That formula appears to be a category of retrospection, applied to material which does not admit of any narrower or more special retrospective formulation.

The inference from this is that our predicate 'reality' is not adequately expressed, in certain cases—cases of vital and psychological organization—in terms of the experienced behaviour of so-called real content. The very experience on the basis of which we are wont to predicate reality testifies to its own inadequacy. We seem to be shut up to the alternatives that either the notion of reality does not rest upon experiences of behaviour, or that the problematic judgments based upon those experiences of progressive organization which we know currently under the term development are as fundamental to these kinds of reality as are those more static judgments based on history or origin.

It may be well, in view of the importance of this conclusion, to see something more of its bearings in philosophy. The historical theories of design, or TELEOLOGY (q. v.) in nature, have involved this question. Those familiar with the details of the design arguments pro and con will not need to have brought to mind the confusion which has arisen from the mixing up of the 'prospective' and 'retrospective' points of view. Design, to the mind of many of the older theistic writers, was based upon relative unpredictability—or better, infinite improbability. Such an argument looks forward: it is reasoning in the category of organization, and under the prospective reference. The organization called mental must be appealed to. What, was asked, is the probability of the letters of the *Iliad* falling together so as to spell out the *Iliad*? Their opponents, on the other hand, have said: Why is not the *Iliad* combination as natural as any other?—one combination has to happen; what is to prevent this? If a child who cannot read should throw the letters, the *Iliad* combination would be no more strange to him than any other. These men are reasoning in the retrospective categories. They are interpreting facts. The fault of the latter position is that it fails to see in reality the element of organization which the whole series when looked at from the antecedent point of view of the production of the real *Iliad* requires. It is true that the *Iliad* is one of an infinite number of possible combinations; but it is also true that Homer did not try the other combinations before hitting upon the *Iliad*. What would really happen, further, if the child should throw the *Iliad* combination, would be that nature had produced a second time a combination once before produced without other trials (in the mind of Homer, and through him in ours), and it is the correspondence of the two—apart from the meaning of the text of the *Iliad*, i. e. its original production—which would surprise us. But this added element of organization needed to bring nature into accord with thought, and which the postulate of design makes in reaching a designer—this is not needed for the mere historical or retrospective interpretation of the facts. In other words, if the opponents of design are right in holding to a complete reduction of organization to retrospective categories, they ought to be able to produce intelligible results by throwing a multiple of twenty-six dice each marked with a letter of the alphabet. They of course cannot; but that does not make it necessary to deny the absolute universality of the retrospective categories: for after the *Iliad* is produced it may be considered one of an infinite number of possible combinations, happening in accordance with the law of PROBABILITY (q. v., especially the criticism of 'inverse' probability).

The later arguments for design, therefore, which tend to identify it with future organization, and to see in it, so far as it differs from natural law, simply a harking forward to that career of things which is not yet unrolled, but will be in accordance with thought—yet which, when completely unrolled, will still be a part of the final statement of origins in terms of natural law—this general view has so much justification.

Further, it is clear that the two opposed views of adaptation in nature are both genetic views—instead of being, as is sometimes thought, one genetic (that view which interprets the adaptation after it has occurred) and the other analytic or intuitive (that view which seeks a beforehand construction of design). The former of these is usually accredited to the evolution theory; and properly so, seeing that the evolutionist constantly looks backward. But the other view, the design view, is equally genetic. For the category of organization by which it proceeds is also distinctly an outcome of the movement or drift of experience towards the realization of career. Teleology, then, when brought to its stronghold, is a genetic outcome, and owes what force it has to the very point of view that its most fervent advocates—especially its theological advocates—are in the habit of running down. The consideration of the stream of genetic history itself, no less than the attempt to explain the

progress of the world as a whole, its career, leads us to admit that the real need of thinking about the future in terms of organization is as great as the need of thinking about the past in terms of natural law. The need of mental organization or design is found in the inadequacy of natural law to explain the further career of the world—and its past career also, as soon as we go back to any place in the past and ask the same question there of the part which then becomes future. It would be possible, also, to take up this last remark for further thought, and to make out a case for the proposition that the categories of 'retrospective' thinking also involve a strain of organization—a proposition which is equivalent to one which the idealists are forcibly urging from other grounds and from another point of view. Lotze's argument to an organization at the bottom of natural causation has lost nothing of its power. Ormond (*Foundations of Knowledge*) has given us an argument for a social interpretation of physical interaction. It is hard to see the force of the assumption tacitly made by the positivists, and as tacitly admitted by their antagonists, that causation, viewed as a category of experience, is to be ultimately understood entirely under such retrospective constructions as 'conservation of energy,' &c. Such constructions involve an endless retrospective series. And that is to say that the problem of origin is finally insoluble. Well, so it may be. But yet one may ask, why this emphasis of the 'retrospective'—a category which has arisen with just the basis of experience that the 'prospective' also has? It may be a matter of taste; it may be a matter of 'original sin.' But if we go on to try to unite our categories of experience in some kind of a broader logical category, then the notion of the ultimate, it would seem, must require—and somehow combine—both of the aspects which our conception of reality includes; the 'prospective' no less than the 'retrospective.' Origins must take place continually as truly as must sufficient reasons. The only way to avoid this is to say that reality has neither forward nor backward reference. So say the idealists who find in 'thought' a *punctum stans* which is not in time. But in dealing with reality we are dealing with experience; and the opinion has some force that thought which looks neither backwards nor forwards—whatever further category it may have under which the antithesis may be transcended—is not thought at all.

Another subtlety might raise its head in the inquiry whether in their origin all the categories themselves did not have a 'natural history.' If so, it might be said, we are bound, in the very fact of thinking at all, to give exclusive recognition to the historical aspect of reality. But here is just the question: does the outcome of career to date give exhaustive statement of the idea of the career as a whole? There would seem to be two valid objections to it. First, it would be, even from the strictly objective point of view, the point of view of physical science, to construe the thing mind entirely in terms of the behaviour of its stages antecedent to the present: that is, entirely in terms of descriptive content, by use of the categories of retrospective interpretation. And, second, it does not follow that because a mental way of regarding the world, i. e. the way of prospection, is itself a genetic growth, therefore it is a misleading way, for the same might be urged against the categories of descriptive science, i. e. the retrospective, which have had the same origin.

There are one or two points among many suggested by the foregoing which it may be well to refer to. It will be remembered that in speaking of the categories of organization as having prospective reference, instances were adduced largely drawn from the phenomena of life and mind, contrasting them somewhat strongly with those of chemistry, physics, &c. The use afterwards made of these categories now warrants us in turning upon that distinction, in order to see whether our main results hold for the aspects of reality with which those sciences deal as well. It was intimated above in passing that the other categories of reality, such as causation and mechanism, are really capable of a similar evaluation as that given to teleology. This possibility may be put in a little stronger light.

It is evident, when we come to think of it, that all organization in the world must rest ultimately on the same basis; and the recognition of this is the strength of thoroughgoing naturalism and absolute idealism alike. The justification of the view is to be made out, it would appear, by detailed investigation of the genetic development of the categories. The way the child reaches his notion of causation, for example, or that of personality, is evidence of the way we are to consider the great corresponding race-categories of thought to have been reached: and the category of causation is, equally with that of personality

or that of design, a category of organization. The reason that causation is considered a cast-iron thing, implicit in nature in the form of 'conservation of energy,' &c., is that in the growth of the rubrics of thought certain great differentiations have been made in experience according to observed aspects of behaviour, and those events which exhibited the more definite, invariable aspects of behaviour have been put aside by themselves; not of course by a conscious convention of man's, but by the conventions of the organism working under the very method which we come—when we make it consciously conventional—to call this very category of organization. What is conservation but a kind of organization looked at retrospectively and conventionally? Does it not hold simply because my organism has made the convention that only that class of experiences which are 'objective' and regular and habitual to me shall be treated together, and shall be subject to such a regular mental construction on my part?

But the tendency to make all experience liable to this kind of causation is an attempt to undo nature's convention—to accept one of her results, which exists only in view of a certain differentiation of the aspects of reality, and apply this universally to the subversion of the very differentiation on the basis of which it has arisen. The fact that there is a class of experiences whose behaviour issues in such a purely historical statement and arouses in me such a purely habitual attitude, is itself witness to a larger organization—that of the richer consciousness of expectation, volition, and prophecy. Otherwise conservation could never have secured abstract statement in thought.

The reason that the category of causation has assumed its show of importance is just that which intuitionist thinkers urge; and a historical example of confusion due to their use of it may be used for illustration. Causation is about as universal a thing—in its application to certain aspects of reality—as could be desired. And we find men of this school using this fact to reach a certain statement of theism. But they then find a category of 'freedom' claiming the dignity of an intuition also; and although this comes directly in conflict with the uniformity ascribed to the other, nevertheless it also is used to support the same theistic conclusion. The two arguments read: (1) an intelligent God exists because the intelligence in the world must have an adequate cause, and (2) an intelligent God exists because the consciousness of freedom is sufficient evidence of a self-active intelligence in the world, which is not caused. All we have to say, in order to avoid the confusion, is that any mental fact is an 'intuition' in reference only to its own content of experience. Intelligence viewed as a natural fact, i. e. retrospectively, has a cause; but freedom in its meaning in reality, i. e. with its prospective outlook, as prophetic of novelties, is not adequately construed in terms of history. So both can be held to be valid, but only by denying universality to each 'intuition' and confining each to its sphere and peculiar reference in the make-up of reality.

Another thing to be referred to in this rough discussion concerns the more precise definition of 'origin.' How much of a thing's career belongs to its origin? How far back must we go to come to origin?

Up to this point the word has been used with a meaning which is very wide. Without trying to find a division of a thing's behaviour which distinguishes the present of it from its history, we have rather distinguished the two attitudes of mind engendered by the contemplation of a thing, i. e. the 'retrospective' attitude and the 'prospective' attitude. When we come to ask for any real division between origin and present existence, we have to ask what a thing's present value is. In answer to that, we have to say that its present value resides very largely in what we expect it to do; and then it occurs to us that what we expect it to do is no more or less than what it has done. So our idea of what is, as we said above, gets its content from what has been. But that is to inquire into its history, or to ask for a fuller or less full statement of its origin or career. So the question before us seems to resolve itself into the task of finding somewhere in a thing's history a line which divides its career up to the present into two parts—one properly described as origin, and the other not. Now, on the view of the naturalist pure and simple, there can be no such line. For the attempt to construe a thing entirely in terms of history, entirely in the retrospective categories, would make it impossible for him to stop at any point and say, 'This far back is nature and further back is origin'; for at that point the question might be asked of him, 'What is the content of the career which describes the thing's origin?'—and he would have to reply in exactly the

same way that he did if we asked him the same question regarding the thing's nature at that point. He would have to say that the origin of the thing observed later was described by career up to that point; and is not that exactly the reply he would give if we asked him what the thing was which then was? So to get any reply to the question of the origin of one thing different from that to the question of nature at an earlier stage, he would have to go still further back. But this would only repeat his difficulty. So he would never be able to distinguish between origin and nature except as different terms for describing different sections of one continuous series of aspects of behaviour. This dilemma holds also, I think, in the case of the intuitionist. For as far as he denies the natural history view of origins and so escapes the development above, he holds to special creation by an intelligent Deity; but to get content to his thought of Deity he resorts to what he knows of mental behaviour. The nature of mind then supplies the thought of the origin of mind.

Of course, on the view developed, the question of the ultimate origin of the universe may still come up for answer. Can there be an ultimate stopping-place anywhere in the career of the thing-world as a whole? Does not our position make it necessary that at any such stopping-place there should be some kind of filling drawn from yet antecedent history to give our statement of the conditions of origin any distinguishing character? It seems so. To say the contrary would be to do in favour of the prospective categories what we have been denying the right of the naturalist to do in favour of those of retrospect. Neither can proceed without the other. The only way to treat the problem of ultimate origin is not to ask it, as an isolated problem, but to reach a category which intrinsically resolves the opposition between the two phases of reality. Lotze says that the problem of philosophy is 'to inquire what reality is, not how it is made; and this will do if we remember that we must exhaust the empirical 'how' to get a notion of the empirical 'what,' and that there still remains over the 'prospect' which the same author has hit off in his famous saying: 'Reality is richer than thought.' To desiderate a what which has no how—this seems as contradictory as to ask for a how in terms of what is not. It is really this last chase of the 'how' that Lotze deprecates—and rightly.

Of the great historical solutions, that of the intellectualists leans to the retrospective, that of the voluntarists to the prospective; a consistent affectivist theory has never been worked out, although something might be said for a form of what we may baptize beforehand as 'aesthonomic idealism'—aesthetic experience being made the metaphysical prius both of science and of value. This would be no doubt as profitable as the Hegelian logicism which reads reality out of the categories in order to transcend their oppositions.

The conclusions may be summed up in certain tentative propositions as follows:—

(1) All statements of the nature of 'things' get their matter mainly from the processes which they have been known to pass through: that is, statements of nature are for the most part statements of origin.

(2) Statements of origin, however, never exhaust the reality of a thing, since such statements cannot be true to the experiences which they state unless they construe the reality not only as a thing which has had a career, but also as one which is about to have a career; for the expectation of the future career rests upon and is produced by the same historical series as the belief in the past career. Cf. PRAGMATISM, passim.

(3) All attempts to rule out prospective organization or teleology—the belief in the correspondence between reality and thought—from the world would be fatal to natural science, which has arisen by a series of provisional retrospective interpretations of just this kind of organization: and fatal also to the historical interpretation of the world found in the evolution hypothesis; for the category of teleology thus understood is but the prospective reading of the same series which, when read retrospectively, we call evolution. Cf. the remarks on teleology and evolution under HEREDITY.

(4) The fact that mental products, ideas, intuitions, &c., have a natural history is no argument against their validity or worth as having application beyond the details of their own history; since, if so, then a natural history series can issue in nothing new. But that is to deny the existence of the idea or product itself, for it is a new thing in the series in which it arises.

(5) All these points may be held together in a view which gives each mental content a twofold function in the mental life. Each such content begets two attitudes in the progressive development of the individual. So

far as it fulfils earlier habits, it begets and confirms the historical or retrospective attitude; so far as it is not entirely exhausted in the channels of habit, it begets the expectant or prospective attitude.

(6) The final account of reality must invoke a category which in some way reconciles these two points of view.

Literature: RITCHIE, Darwin and Hegel, chap. i; ROYCE, Spirit of Mod. Philos., in loc.; and Int. J. of Ethics, July, 1895; BALDWIN, Int. J. of Ethics, Oct., 1895; The Origin of a Thing and its Nature, Psychol. Rev., ii, 1895, 551 ff. (a paper which this article in part repeats); URBAN, Psychol. Rev., iii, 1896, 73 ff. (J.M.B.)

Original: Ger. *ursprünglich, originell*; Fr. *original*; Ital. *originale, originario.* (1) Adjective of origin, meaning (*a*) primitive, (*b*) fundamental (original truth), (*c*) underived (original qualities, Locke). Cf. GENESIS.

(2) COPY (q. v., sense 1) or MODEL (q. v.).

(3) Applied also to that from which something originates: e.g. original thinker, original source, &c. (J.M.B.)

Original Quality: see ORIGINAL (1 *c*), and QUALITY.

Original Sin: Ger. *Erbsünde*; Fr. *péché originel*; Ital. *peccato originale.* A natural tendency or disposition to evil in human nature which is ascribed to the fall of man and which tends inevitably to actual sin in the individual life. See SIN.

Original sin is related to total depravity as a concomitant effect of the fall of man. The great exponent of the doctrine among early thinkers is Augustine. It has been denied by Pelagians and Socinians. The dogma is one of the essential features of Calvinism.

Literature: JULIUS MÜLLER, Die christl. Lehre v. d. Sünde (6th ed., 1877; Eng. trans. of same, Edinburgh, 1877); JONATHAN EDWARDS, The Great Doctrine of Original Sin defended, ii (Worcester ed.). Works on THEOLOGY (q. v.). (A.T.O.)

Orphic Literature: Ger. *orphische Dichtungen*; Fr. *littérature orphique, les orphiques*; Ital. *letteratura orfica.* A collection of poems and hymns ascribed to Orpheus, the mystic founder of a religious sect or school which arose in Greece during the 6th century B. C., but which were actually composed at different periods by a number of representatives of the sect.

Of Orpheus, who is celebrated both as a divine player on the lyre and as the poet founder of a religion, there is no trustworthy evidence (so Aristotle thinks) that he was a real personage. The doctrines of the sect are a compound of Bacchic mysteries and the philosophical tenets of the Pythagoreans. Except a few fragments which have been collected by Lobeck, and other verses found later and dating probably from the 3rd century B.C., the Orphic literature, which held a prominent place in the contests and religious mysteries of Greece, has been lost.

Literature: LOBECK, Aglaophamus (1829); ABEL, Orphica (Berlin, 1885); GRUPPE, Die griechischen Culte u. Mythen (Leipzig, 1887). (A.T.O.)

Orthodoxy (in theology) [Gr. *ὀρθός*, straight, + *δόξα*, opinion]: Ger. *Orthodoxie*; Fr. *orthodoxie*; Ital. *ortodossia.* Correctness of belief as determined by the authoritative symbols of an ecclesiastical organization, in the light of some accepted interpretation.

The notion of orthodoxy presupposes some ultimate court of appeal. On this there is no general agreement among Christians. Roman Catholics find the ultimate test of orthodoxy in the deliverance of an infallible pope or an infallible church, while Protestants as a rule make the final appeal to Scripture. This, however, is not strictly final, as some interpretation of Scripture must be accepted as standard. Orthodoxy is a purely relative term, and always presupposes an attitude of conformity to an accepted standard of belief.

Literature: SHEDD, Orthodoxy and Heterodoxy (1893); NEWMAN SMYTH, The Orthodox Theol. (1883). (A.T.O.)

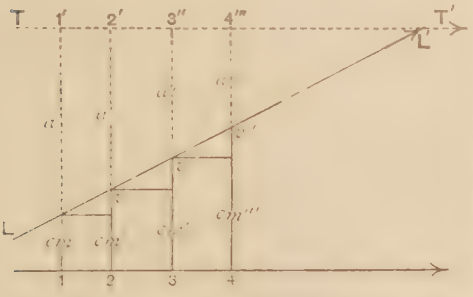
Orthogenesis [Gr. *ὀρθός*, straight, + *γένεσις*, origin]: Ger. *Orthogenesis*; Fr. *orthogénèse, évolution orientée*; Ital. *ortogenesi.* Evolution which is definitely directed or DETERMINATE (q.v.) by reason of the nature or principle of life itself. Cf. DESCENT (theory of), NATURAL SELECTION, and ORTHOPLASY.

That organic evolution follows certain predetermined lines quite irrespective of any 'selection' due to the action of the environment has been the belief of many naturalists. Eimer terms such definitely directed evolution, to which any selection which may occur is merely subsidiary, Orthogenesis. 'There is,' he says, 'no chance in the transmutation of forms. There is unconditioned conformity to law only. Definite evolution, orthogenesis, controls this transmutation. It can lead step by step from the simplest and most inconspicuous beginning to ever more perfect creations, gradually or by leaps; and the cause of this definite evolution is organic growth.' Eimer has discussed his views in

relation to the Lepidoptera at considerable length. Many biologists fail to find in his discussion any indication of the organic antecedents of particular lines of growth or transmutation. The conception would seem to be a form of vitalism, involving 'self-adaptation' of individual organisms, and the inheritance of acquired characters. See Eimer, 'Orthogenesis,' *Verh. d. Deutsch. Zool. Gesell.* (1895, Eng. trans., *On Orthogenesis*). Delage, however (*Structure du Protoplasma*, 46), attributes the term orthogenesis to Haake. (C.Ll.M.–J.M.B.)

Orthognathous (skull): see PROGNATHISM.

Orthoplasy [Gr. *ὀρθός*, straight, + *πλάσις*, a fold]: Ger. *Orthoplasie*; Fr. *orthoplastie*; Ital. *ortoplasia*. Determinate or definitely directed evolution under the laws of NATURAL and ORGANIC SELECTION (see those terms).



Evolution by orthoplasy. L, L′, line of evolution; 1, 2, &c., successive generations by physical heredity; T, T′, line of tradition (social heredity); *cm*, *cm′*, &c., congenital mean; *a*, *a′*, &c., accommodations supplementing *cm*, &c.; *v*, *v′*, &c., (congenital) variations in direction of *a*, &c. The species is kept alive by *a*, *a′*, &c., and T, T′, &c., during evolution of *cm*.

This term has been suggested and adopted by the advocates of the theory of organic or indirect selection as opposed to ORTHOGENESIS (q.v.), the latter having a vitalistic meaning, and implying Lamarckian heredity. Orthoplasy, on the contrary, emphasizes natural selection working upon variations in many cases screened and fostered by the presence of individual modifications. Cf. CONVERGENCE (in biology), ad fin.

This theory of evolution may be illustrated by the accompanying diagram, which should be compared with the similar ones given under NATURAL SELECTION and LAMARCKISM.

Literature: see ORGANIC (OR INDIRECT) SELECTION. (J.M.B., C.Ll.M.)

Orthos Logos [Gr. *ὀρθὸς λόγος*]. Right REASON (q. v.) in various senses in ancient philosophy. Cf. Eisler, *Wörterb. d. philos. Begriffe*, sub verbo. (J.M.B.)

Other: see SAME AND OTHER, and ALTER.

Otology [Gr. *οὖς*, *ὠτός*, ear]: Ger. *Ohrenkunde*; Fr. *otologie*; Ital. *otologia*. The science of the ear, its anatomy, physiology, and pathology. See Ear under HEARING. (C.F.H.)

Oughtness (and **Ought**) [AS. *āhte*, from *āgan*, to owe]: Ger. *das Sollen*; Fr. *devoir* (duty), *ce qui doit être*; Ital. *dovere*, *ciò che deve essere*. 'Oughtness' is the COEFFICIENT (q. v.) of the ethical to which the moral nature responds. The 'ought' is distinguished from the 'is' as the ideal from the actual in the ethical sphere.

The term suggests the idea of debt, or something which we 'owe' to another, and the intuitional school have argued that it implies the idea of One to whom we owe the conduct in question—namely, God. Kant deduced the freedom of man as a moral being from the moral consciousness of oughtness: 'Thou shalt' implies 'thou canst.' The ethical empiricists or 'realists' have always sought, particularly by investigating the 'sanctions' of virtue, to make the ideal in some way a function of the actual, the 'ought' a function of the 'is,' e. g. the Utilitarians and the Evolutionists. Cf. OBLIGATION (moral), and SANCTION (moral). (J.S.–J.M.B.)

Ousia [Gr.]: see GREEK TERMINOLOGY, Glossary, HOMOIOUSIA, and HOMOOUSIA.

Outer and **Inner**: see EXPERIENCE, and cf. OUTNESS.

Outness [AS. *ūt*, out]: Ger. *Aussensein*; Fr. *externalité*; Ital. *esteriorità*. Distance; externality in space; externality to mind.

The term was introduced by Berkeley in his *Essay towards a new Theory of Vision* (46), also *Principles of Knowledge* (47). In each case it is used as synonymous with space and distance. Hume uses it also as equivalent to distance (*Treatise*, Bk. I. Pt. IV. § 2). So also Reid and Hutchinson Stirling. Huxley: 'sense of outness, power of distinguishing between the external world and himself' (*Physiology*, § 289). (J.D.)

Overindividual. Ger. *überindividuell*; Fr. and Ital. equivalents not in use. Any act or object of real personality is overindividual if it is acknowledged as belonging to every real personality in the fulfilment of its meanings. These meanings constitute, with regard to objects, the physical universe; and with regard to attitudes, they constitute ethical, logical, and aesthetic obligations. (H.M.)

This term as defined above is used by Münsterberg (*Psychol. and Life*), and translates the German überindividuell. (J.M.B.)

Overproduction (in biology): see EXCESS, and PRODIGALITY OF NATURE.

Overproduction (in economics): Ger. *Ueberproduktion*; Fr. *excès de l'offre* (or *de production*); Ital. *eccesso di produzione*. A continuance of supply at prices which are not remunerative to the producer.

When there are large investments of fixed capital, it may involve a worse loss to stop work than to go on at a disadvantage; and in these cases overproduction may continue for a long period.

It is argued by most writers that what is called overproduction is really disproportionate production. It is not that we have too much of some things, but too few of others to exchange for them. But an application of the theory of utility shows the error of this view. It is conceivable that products of a certain kind should be so multiplied that their utility would be less than their cost. For overproduction, be it observed, does not mean that more goods are produced than people can consume, but more than they are willing to pay for.

In practice, the cause of what is known as general overproduction is a scarcity of means of payment, due to a contraction of credit, or to a commercial crisis. (A.T.H.)

Oversoul: Ger. *Ueberseele*; Fr. (no exact equivalent—TH.F.); Ital. (not in use). A term used by Emerson to express the Absolute Unity, in which subject and object, the knowing and the known, are one; the total reality in which are included all parts of the universe, and all our partial, successive thoughts and acts. It connotes this absolute reality particularly as the source of all that is most universal and valuable in the experience of man: genius in his intellect, virtue in his will, and love in his emotions. See Emerson, *Essays*, 'Oversoul.' (J.D.)

Overtone: Ger. *Oberton*; Fr. *harmonique, ton supérieur*; Ital. *armonica, tono armonico*. The upper partial tones of a COMPOUND TONE (q. v.), i. e. those whose pitch is higher than the pitch of the fundamental. See TIMBRE.

Literature: HELMHOLTZ, Sensations of Tone, 25; SANFORD, Course in Exper. Psychol., expts. 87–9. (E.B.T.)

Ovum [Lat. *ovum*, an egg]: Ger. *Ei*; Fr. *œuf, ovule, ovum*; Ital. *uovo, ovo*. The female sexual product or element.

The term is applied in four different senses, (1) to the ovarian cell or immature ovum, out of which the female product or mature ovum is developed; (2) to the mature ovum, or true female spore; (3) to the mature ovum plus the fecundating spermatozoon uniting with it—that is, to the impregnated ovum; (4) to various stages of the developing embryo. Cf. POLAR BODY, FERTILIZATION, CLEAVAGE, EMBRYO, HETEROLECITHAL, and HOMOLECITHAL.

Literature: MINOT, Human Embryol., 48; E. B. WILSON, The Cell; Y. DELAGE, Structure du Protoplasma (1895); F. M. BALFOUR, Compar. Embryol. (1881). (C.S.M.)

Oxford Movement: see TRACTARIANISM.

Oxy- [Gr. ὀξύς, sharp]: Ger. *Oxy-*; Fr. *oxy-*; Ital. *ossi-* or *oxi-*. Abnormally acute or sharp; as oxyaesthesia, abnormally acute sensibility (occurs in hysteria); oxygeusia, an unusual acuteness of taste. (J.J.)

P

P (in logic). (1) The predicate of a judgment.

(2) The major term of a conclusion, being the predicate of the major premise.

(3) In the mnemonic names for the moods of syllogism it signifies that the proposition denoted by the vowel after which this letter follows is, in the reduction to a direct mood, to be converted *per accidens*; as *Baralipton*, *Felapton*, *Darapti*. Such moods, from the Philonian point of view, are illogical. (C.S.P.)

Paganism [Lat. *paganismus*, from *paganus*, a rustic]: Ger. *Paganismus*; Fr. *paganisme*; Ital. *paganesimo*. A name applied to any non-Christian system that is polytheistic and unspiritual in its character and tendency.

The term paganism originated in the early period of Christianity as a name for heathenism which had its strongholds in the country as distinguished from the towns and cities. It came to be applied to all religions outside of Christianity except Judaism and, later, Mohammedanism. In current thinking the term carries with it the implication of a low degree of culture. (A.T.O.)

Pain and **Pleasure** [OF. *paine, plesir*]: Ger. (1) *Schmerz und Lust*; Fr. (1) *douleur et plaisir*; Ital. (1) *dolore e piacere*; for equivalents for (2) see PLEASANTNESS AND UNPLEASANTNESS. An antithesis of qualities which characterizes the affective aspect of consciousness. Cf. AFFECTION.

The pain (1) which attaches to organic conditions has recently been distinguished somewhat sharply from (2) so-called 'unpleasantness,' the former being considered, on the basis of considerable evidence, as a sensation (see PAIN SENSATION), the latter as a more general affective character attaching, with its antithesis 'pleasantness,' to the mental life in all its phases. A similar distinction between (1) 'pleasure' and (2) 'pleasantness' is also made, but without the same amount of empirical evidence.

Theories of the general nature of the hedonic or pleasure-pain consciousness date from Aristotle. They deal, mostly without sufficient discrimination, with three relatively distinct problems: (1) psychophysical (the organic correlate of hedonic states); (2) psychological (the place of pleasure and pain in the development of conscious process); (3) genetic or biological (the origin and evolutionary significance of hedonic consciousness together with its organic correlate).

Terms which are to be met with in the discussions of the topic are hedonic (belonging to pleasure or pain), hedonics (the psychological theories of them), pleasure-pain and algedonics (terms suggested by Marshall as convenient for their double reference to both the hedonic qualities), hedonic consciousness (a supposed primitive consciousness or a purely abstract consciousness in which only hedonic differences are present).

Literature: see BIBLIOG. G, 2, *e*, and under EMOTION; also the textbooks of psychology (lists are given in VOLKMANN, DEWEY, BALDWIN, LADD, JODL). (J.M.B.)

Pain (aesthetic). Unpleasant aesthetic feeling. See PAIN AND PLEASURE (2).

Like aesthetic 'pleasure,' the word is employed in a wider sense to designate a total psychosis, whether simple or complex (e.g. an emotion), characterized by unpleasantness; and in a narrower sense as applying to the affective tone or aspect of such a psychosis. By certain authorities pain is regarded as

a merely negative aesthetic category, opposed to and limiting the pleasure felt in beauty. (Thus Lessing, in his theory of painting. Also Santayana, in his theory of aesthetics.) Other writers (e.g. Fechner) defend the disagreeable as of indirect aesthetic value, because it augments pleasure through contrast. It is generally admitted as a necessary feature of the pathetic and tragic (Schiller), and by many authorities is recognized as a factor in the sublime, whether as involving the element of terror (Burke) or (Kant) the element of formlessness akin to the UGLY (q.v.).

Literature: HAMILTON, Lects. on Met. (6th ed., 1877); MARSHALL, Pain, Pleasure, and Aesthetics (1894); BOSANQUET, Hist. of Aesthetic (1892); RIBOT, Psychol. of the Emotions (Eng. trans., 1897). (J.R.A.)

Pain Sensation: Ger. *Schmerz*; Fr. (*sensation de*) *douleur*; Ital. *dolore* (*sensazione di*). Pain which is also SENSATION (q.v.). See PAIN AND PLEASURE (1). (J.M.B.)

The sensation of pain has presented great difficulties to introspective analysis. This is due to two causes: (1) pain, the sensation, has been confused with the general affective state of unpleasantness or disagreeableness; (2) pain may be aroused in the skin and muscle that attach to any sense-organ. Hence it has been regarded as a 'common' sensation, producible by excessive stimulation of each and every organ; it has been referred to the organ itself instead of to the cutaneous and muscular attachments of the organ.

As regards cutaneous pain, we now possess evidence sufficient in the opinion of many to show that it is a specific sensation, resident in PAIN SPOTS (q.v.). In general, pain spots are more numerous even than pressure spots. Some suppose that the end-organs of pain are the free intra-epithelial nerve-endings of the epidermis. The pain organs in cutis, muscle, &c., are unknown.

Literature: VON FREY, Ber. d. k. sächs. Gesell. d. Wiss. (July 2, 1894; Dec. 3, 1894; March 4, 1895); Abhandl. d. k. sächs. Gesell. d. Wiss., xxiii. 3 (1896); HEAD, Brain (1893, 1894, and 1896); LEHMANN, Hauptgesetze d. menschl. Gefühlslebens (1892), 31 ff.; WUNDT, Physiol. Psychol. (4th ed.), i. 110 ff., 412, 419, 436 f., 557, 560; WITMER, Twentieth Cent. Pract. of Med., xi (1897); H. NICHOLS, Psychol. Rev., ii; and Philos. Rev., 403, 518; STRONG, The Psychology of Pain, Psychol. Rev. ii, July, 1895; MANTEGAZZA, Fisiol. del dolore; SERGI, Dolore e piacere. Cf. HAPTICS, and SUMMATION. (E.B.T.-J.M.B.)

Pain Spots: Ger. *Schmerzpunkte*; Fr. *points de douleur*; Ital. *punti di dolore, punti algesici*. Spots of peculiar sensitiveness to pain, interspersed among the pressure and temperature spots of the skin. Cf. PAIN SENSATION, and TEMPERATURE SPOT.

A map of distribution, values of liminal stimulus, &c., are given by von Frey, *Abhandl. d. k. sächs. Gesell. d. Wiss.* (1896). (E.B.T.)

Palatals: see PHONETICS.

Paleontology [Gr. παλαιός, ancient, + ὄντα, beings, + λόγος, discourse]: Ger. *Palaeontologie*; Fr. *paléontologie*; Ital. *paleontologia*. The science of extinct or fossil animals and plants. (C.S.M.)

Literature: H. ZITTEL, Handb. d. Paleontologie; NICHOLSON and LYDEKKER, Palaeontology. (E.S.G.)

Paley, William. (1743–1805.) Educated at Christ's College, Cambridge. Fellow of Christ's College, 1766; lecturer on moral philosophy and divinity, 1768; took orders in the Anglican Church; rector at Musgrove, 1775; vicar of Dalston, 1776; prebendary (1780), archdeacon (1782), and chancellor (1785) of Carlisle; prebendary of St. Paul's, London, 1793; sub-dean of Lincoln and rector of Bishop Wearmouth, 1795.

Palingenesis [Gr. πάλιν, again, + γένεσις, becoming, birth]: Ger. *Palingenese*; Fr. *palingenèse*; Ital. *palingenesi*. (1) The doctrine that the soul passes through a succession of rebirths: METEMPSYCHOSIS (q.v.).

(2) Also sometimes used, in theological writings, to express REGENERATION (q.v.), of which it is the literal equivalent.

(3) The term has a technical philosophic significance only in the writings of Schopenhauer, who uses it to express the fact that will is untouched by death, and reappears in a new individual, until the will-to-live is completed, denied, and abrogated. He distinguishes it from metempsychosis as the vulgar doctrine that the concrete 'soul' reappears, but claims it is identical with the esoteric teaching of Buddhism (Schopenhauer, *The World as Will and as Idea*, trans. by Haldane, iii. 300–1). (J.D.)

Palingenesis (in biology). The development of an individual which truly copies or repeats ancestral development.

The term was proposed by Haeckel as the opposite of Cenogenesis, the development of an individual which is false to its lineage or ancestry. Cf. BIOGENETIC LAW, ONTOGENY, and RECAPITULATION. (C.S.M.)

Palingenetic Characters: see PALINGENESIS, and BIOGENETIC LAW.

Palmistry [Lat. *palma*, the palm of the hand]: Ger. *Chiromantik, Handdeuterei*; Fr. *chiromancie*; Ital. *chiromanzia*. A pseudo-science whose devotees claim to read character, and to foretell the future by the lines and marks of the palm of the hand. Cf. CHIROMANCY, and GRAPHOLOGY. (J.J.)

Panentheism [Gr. *πᾶν*, all, + *ἐν*, in, + *θεός*, God]: Ger. *Panentheismus*; Fr. *panenthéisme*; Ital. *panenteismo*. A name given by Krause to his attempted reconciliation of theism and pantheism; the doctrine that God is neither the world, nor yet outside the world, but that the world is in him, and that he extends beyond its limits. (J.D.)

Pangenesis: Ger. *Pangenesis*; Fr. *pangenèse*; Ital. *pangenesi*. The name given by Darwin to the hypothesis of heredity, which he originally formulated, that the cells of the parent 'throw off minute granules or atoms, which circulate freely throughout the system, and when supplied by proper nutriment multiply by self-division, subsequently becoming developed into cells like those from which they were derived. The granules may be called *gemmules*. They are supposed to be transmitted from the parents to the offspring, and are generally developed in the generation which immediately succeeds, but are often transmitted in a dormant state during many generations, and are then developed' (Darwin, *Animals and Plants under Domestication*, ii. chap. xxvii).

Modifications of the hypothesis have been suggested by W. R. Brooks, H. de Vries, and others, but the hypothesis is not now accepted in any form by the majority of biologists.

This provisional hypothesis was first published in 1860. As subsequently remodelled, it involves the following assumptions (summarized by Romanes):—

(1) That all the component cells of a multicellular organism throw off inconceivably minute germs, or 'gemmules,' which are then dispersed throughout the whole system.

(2) That these gemmules, when so dispersed and supplied with proper nutriment, multiply by self-division, and under suitable conditions are capable of developing into physiological cells like those from which they were originally and severally derived.

(3) That, while still in this gemmular condition, these cell-seeds have for one another a mutual affinity, which leads to their being collected from all parts of the system by the reproductive glands of the organism; and that, when so collected, they go to constitute the essential materials of the sexual elements —ova and spermatozoa being thus aggregated packets of gemmules, which have emanated from all the cells of all the tissues of the organism.

(4) That the development of a new organism, out of the fusion of two such packets of gemmules, is due to a summation of all the developments of some of the gemmules which these two packets contain.

(5) That a large proportional number of the gemmules in each packet, however, fail to develop, and are then transmitted in a dormant state to future generations, in any of which they may be developed subsequently, thus giving rise to the phenomena of reversion or atavism.

(6) That in all cases the development of gemmules into the form of their parent cells depends on their suitable union with other partially developed gemmules, which precede them in the regular course of growth.

(7) That gemmules are thrown off by all physiological cells, not only during the adult state of the organism, but during all stages of its development; or, in other words, that the production of these cell-seeds depends upon the adult condition of parent cells, not upon that of the multicellular organism as a whole.

In this theory Darwin attempted to account for the transference to the germinal cells not only of the effects of use and disuse in other cells, but also of the normal characteristics of the physiological tissues. It is now questioned whether the effects of use and disuse are thus transferred; while the recurrence of similar characteristics of the physiological tissues is, by many biologists, explained as the result of the continuity of the germinal substance, the germinal substance of generations p, q, r being in direct continuity with that of their predecessors m, n, o. Cf. HEREDITY, and LIVING MATTER.

Literature: C. DARWIN, Animals and Plants under Domestication; A. WEISMANN, The Germ-Plasm; W. K. BROOKS, The Law of Heredity (1883); H. DE VRIES, Intracellulare Pangenesis; G. J. ROMANES, Darwin and after Darwin. (C.LL.M.)

Panlogism [Gr. *πᾶν*, all, + *λόγος*, thought, reason]: Ger. *Panlogismus*; Fr. *panlogisme*; Ital. *panlogismo*. A term applied to philosophic systems which make thought the absolute—usually to the system of Hegel. (J.D.)

Panmixia [Gr. *πᾶν*, all, + *μῖξις*, a mixing]: Ger. *Panmixie*; Fr. *panmixie*; Ital. *panmissia*. Promiscuous interbreeding within the

limits of a species or other group as contrasted with breeding under artificial selection or other form of isolation. (C.Ll.M.–J.M.B.)

Romanes drew attention to the effects of cessation of selection, which involves the perpetuation of mediocrity. Weismann laid stress on the promiscuous interbreeding which results, and termed it panmixia. The dwindling of vestigial organs was attributed by both authors in large degree to panmixia with cessation of selection. Lankester and others contend that, in the absence of other factors, there could be no dwindling beyond the existing birth-mean of the species, and economy of growth and germinal selection have been suggested as additional factors. Pearson claims to have demonstrated, mathematically, that 'panmixia without active reversal of natural selection does not lead to degeneration' (on the basis of GALTON'S LAW, q. v., of ancestral heredity). Cf. AMIXIA.

Literature: WEISMANN, Essays, i; The Germ-Plasm; Germinal Selection; ROMANES, Darwin and after Darwin, ii; PEARSON, Proc. Roy. Soc., meeting of Jan. 27, 1898, and Science, Mar. 11, 1898, 339. (C.Ll.M.)

Panpneumatism [Gr. πᾶν, all, + πνεῦμα, spirit]: Ger. *Panpneumatismus*; Fr. *panpneumatisme*; Ital. *panpneumatismo*. A term used by v. Hartmann (only) to designate a 'higher synthesis of PANLOGISM (q. v.) and PANTHELISM (q. v.), according to which the absolute is both will and thought.' (J.D.)

Panpsychism [Gr. πᾶν, all, + ψυχή, soul]: Ger. *Pampsychismus, Allbeseelung*; Fr. *panpsychisme*; Ital. *panpsichismo*. (1) The theory that all matter, or all nature, is itself psychical, or has a psychical aspect; that atoms and molecules, as well as plants and animals, have a rudimentary life of sensation, feeling, and impulse, which bears the same relation to their movements (whether causal or parallel) that the psychical life of human beings does to their objective activities. The theory is a revival, under conditions of modern science, of ancient ANIMISM (q. v.) and HYLOZOISM (q. v.).

(2) The term is also used (as by Windelband) to designate the Arabian interpretation of Aristotle's doctrine of reason, according to which man's reason is but a special mode of an eternal, impersonal divine Reason. See AVERROISM.

Literature: FECHNER, Ueber die Seelenfrage; NANNA, Zend-Avesta; PAULSEN, Introd. to Philos. (Eng. trans.), 91, 99, 131; citations in EISLER, Wörterb. d. philos. Begriffe, 'Pampsychismus.' (J.D.)

Pantheism [Gr. πᾶν, all, + θεός, God]: Ger. *Pantheismus*; Fr. *panthéisme*; Ital. *panteismo*. (1) The term has a wide and loose meaning, especially in controversial writings, where the *odium theologicum* attaches to it; in this way it is used to designate almost any system which transcends current or received THEISM (q. v.) in its theory of a positive and organic relation of God to the world.

Theism, when combined with philosophical dualism, as it is quite apt to be, tends naturally to become DEISM (q. v.), assuming an external and mechanical relation of God to the world of nature and of man. This calls out a reaction on both philosophic and religious grounds. The former reaction occurs because of the difficulties felt in an external relation of the infinite and finite. The latter is made independent, and thus the former practically becomes itself a finite. The connection between them is made one of causation and design merely. Difficulties arise from applying the category of causation to the infinite, especially as the cause is moved back indefinitely in time; while the notion of design is used in such a way as to imply that God is simply an external artificer or mechanic. The religious reaction arises because this external relation does not allow of the intimate communication of the human and divine spirits, the sense of absorption and permeation, which seem to be required by deep religious experience. Hence the attempts to bring the finite into more essential and intrinsic relations to God. If these attempts are animated particularly by the religious motive, they tend to MYSTICISM (q. v.), which is closely akin to pantheism. But, in any case, they are condemned by the deists as tending to swallow up the finite in God, or as pantheistic. As will be evident, even from this brief outline, it is a matter of the nicest balance to keep, especially in Christian theology, the theory of the relation of God as infinite to the world as finite, from leaning to pantheism on one side or to deism on the other.

(2) In its narrower and proper philosophic sense, pantheism is any system which expressly (not merely by implication) regards the finite world as simply a mode, limitation, part, or aspect of the one eternal, absolute Being; and of such a nature that from the standpoint of this Being no distinct existence can be attributed to it. The chief problem of pantheism understood in this way, i.e. as acosmism, is to account for the appearance of self-

subsistence, or separate being, belonging to the finite world.

The Eleatic school (see PRE-SOCRATICS) may be regarded as the forerunners of pantheism in their insistence upon the unity and all-comprehensiveness of true Being. The distinction between finite and infinite, God and the world, had not, however, been made sufficiently clear at this time to justify calling the system pantheism. Through Plato and Aristotle the terms of the problem, both in themselves and in their relation to each other, are made evident. NEO-PLATONISM (q. v.) and STOICISM (q. v.) are both pantheistic. The former is of a logical idealistic type, based upon Plato's theory of the relation of the One Being, *Nous*, and the Ideas; teaching that the world is simply one of a series of emanations from God, radiating from him, as light from the sun, and having its apparent distinction only through a negative element, Non-Being or Matter. Stoicism is a development of Aristotelianism under the influence of the earlier Greek cosmologists, especially Heraclitus.

Neo-Platonism, and some of the congruent ideas of the Stoics (especially of the λόγος σπερματικός), influenced the formation and development of Christian theology; and pantheistic tendencies in the latter accordingly crop out, as in Scotus Erigena (see SCHOLASTICISM) and in the mystics, like Eckhart and Boehme. The doctrines particularly influenced are those of the Trinity and Creation (the latter being a continuation of the quasi-emanistic process which finds its expression in the incarnation of the Father in the Logos, and in the activity of the Spirit); of Redemption, conceived as the necessary return to God, thus completing the circuit, whose first half is the unfolding of the world from God in creation; of religious experience, as the immediate, unhindered, ecstatic converse of the human spirit with God. AVERROISM (q. v.) gave a pantheistic interpretation of Aristotle, and is perhaps even more influential than Neo-Platonism in all the later developments of pantheism, particularly as it is more allied in content and terminology to a scientific view of nature. In Giordano Bruno, this latter motive culminates in a poetic personification of nature; and the humanistic view of the universe displaces the factor of religious experience, so important in mediaeval thought. Later John Toland presented a naturalistic pantheism, identifying God with the forces of nature.

Averroism came to Spinoza through its influence upon Jewish thought, and is by him combined with the mediaeval religious motive, the modern scientific one, and with the problem of Cartesian philosophy regarding the relation of mind and matter in a splendid synthesis which makes him the classic type of pantheistic thought. Spinoza's influence was felt first not in philosophy, but in literature, in Herder, Lessing, and above all in Goethe. Schelling revived pantheism in connection with the problem of subject and object (which had displaced the Cartesian problem of mind and matter) in his philosophy of identity. Hegel attempted here as elsewhere a synthesis of ideas in opposition to each other, viz. theism and pantheism. He adopted the monistic factor of Spinoza, but seized upon his statement that *determinatio est negatio* as the explicit definition of the root of all pantheism (or absorption of the finite into the infinite), and reversed it to mean all negation is determination: i. e. negation is ultimately positive, being the dynamic factor through which Being actualizes itself into full, concrete individuality. Hegel's system broke up into two schools, one avowedly pantheistic (as in Strauss); the other atheistic, holding that God comes to existence merely and only in the evolution of human individuals. v. Hartmann holds that only pantheism is henceforth philosophically possible; Hegel and Schopenhauer, holding principles which in their opposition are exhaustive of the universe, being both pantheists. But by pantheism v. Hartmann seems to mean especially MONISM (q. v.), an identification of terms which seems to be growing, though to be deprecated from the point of view of clearness of thought. Herbert Spencer alternates between a pantheism, in his theory of the absolute unknowable force, and a dualism, in his theory of the relation of mind and matter, subject and object.

Literature: for the most part we must rely upon works upon and by the individual authors, especially SPINOZA. JUNDT, Hist. du Panthéisme populaire (1876, confined to mediaeval pantheism and Eckhart); JÄSCHE, Der Pantheismus (1826); most works on THEISM (q. v.) and antitheistic theories, and the introductions to philosophy (e. g. PAULSEN). See also BIBLIOG. B, 2, *f*. (J.D.)

Panthelism [Gr. πᾶν, all, + θέλειν, to wish, will]: Ger. *Panthelismus*; Fr. *panthélisme*; Ital. *pantelismo* (de Sarlo). The doctrine that will is the basis of the universe; that it is the absolute, or, in a more limited sense, that

reason (intellect) is subordinate to the will, and is to be derived from it.

The term is applied to such systems as Fichte's, with its derivation of knowing from acting, and to Schopenhauer's. See VOLUNTARISM. Cf. Falckenberg, *Hist. of Mod. Philos.* (Index), and Francesco de Sarlo, *Metafisica, scienza e moralità* (1898). (J.D.)

Para- [Gr. *παρά*, beside]: Ger. *para-*; Fr. *para-*; Ital. *para-*. A prefix indicating in pathological terminology a condition deviating from the normal, a perversion; as paraesthesia, subjective and abnormal sensation (such as 'tingling' or 'pricking'); parageusia, a perverted or morbid taste; paragraphia, the making of mistakes in writing; paralexia, misreading, or difficulty in reading; paraphrasia, incoherent speech. See PARALYSIS, and PARANOIA. (J.J.)

Paracelsus. The assumed name of Philippus Aureolus Theophrastus Bombastus von Hohenheim (1493–1541). The son of a physician, he chose the same calling, but wandered about studying the works of alchemists and magicians, gathering information from strange sources as to the art of healing; received the degree M.D.; was military surgeon in Denmark and Italy; professor of medicine and surgery in Basel, 1527; compelled to leave by the Galenic physicians.

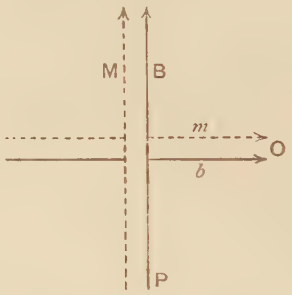
Paradox [Gr. *παρά*, contrary to, + *δόξα*, opinion]: Ger. *paradox* (adj.); Fr. *paradoxe*; Ital. *paradosso*. An opinion surprising or repugnant to an ordinary mind. See De Morgan's *Budget of Paradoxes*. (C.S.P.)

Parallelism (in biology) [Gr. *παρά* + *ἀλλήλων*, of one another, from *ἄλλος*, other]: see CONVERGENCE, and cf. PARALLELISM (psychophysical).

Parallelism (psychophysical): Ger. *psychophysischer Parallelismus*; Fr. *parallélisme psychophysique*; Ital. *parallelismo psicofisico*. The affirmation that conscious process varies concomitantly with synchronous process in the nervous system, whether the two processes have a direct causal relation or not.

This is the most generally accepted view of the relation between mind and body at the present day. A good statement of it from the point of view of psychological method is given by G. E. Müller, Zur Psychophysik der Gesichtsempfindungen, in *Zeitsch. f. Psychol.* (1896), 1–25, and another by Mach, *Analysis of Sensation*, 26–40 (Eng. trans.). The principle of psychophysical parallelism involves no explanatory theory of the connection between conscious and nervous process. Those who accept it may differ on this point very widely. A view often associated with it is Automaton Theory; this denies all agency to consciousness. But those who hold psychophysical parallelism are by no means bound down to this opinion. Clifford, for example, writes as follows: 'A feeling of chill made a man run; strictly speaking, the nervous disturbance which coexisted with that feeling of chill made him run, if we want to talk about material facts, or the feeling of chill produced the form of subconsciousness which coexists with the motion of legs, if we want to talk about mental facts' (quoted by James, *Princ. of Psychol.*, i. 132). Cf. AUTOMATIC AND AUTOMATISM (3), DOUBLE ASPECT THEORY, and MIND AND BODY. (G.F.S.–J.M.B.)

The theory may be extended to apply to the concomitance of conscious and vital process in the evolution of organic forms. This



P, phylogeny; *O*, ontogeny.

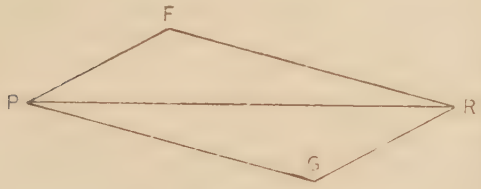
application would constitute a theory which might appropriately be called phylogenetic or racial parallelism, as the application to the individual's psychophysical development constitutes ontogenetic or individual parallelism. The theory in its twofold application thus constitutes a great way of looking at one of the main topics of genetic philosophy. If we represent the mental series by dotted lines (*M*, *m*: mind) and the physical by solid lines (*B*, *b*: body), the two applications of parallelism at the grade of organic evolution represented by any particular animal, *O*, may be shown, as in the accompanying diagram (the relative position of the parallels *O* upon the parallels *P*).

The discussions of psychophysical parallelism have hitherto been in the main restricted to the problem of individual development. The application to racial evolution, however, is an essential part of the view, and should be given equal attention; for no theory of

the relation of mind and body can be permanently established which does not explain the racial concomitance of the two. Furthermore, the biological theory of descent must recognize mental evolution along with, and possibly as essential to, organic evolution; and the problems thus arising for the psychologist and philosopher cannot be set aside. We may note, for example, the questions of mental RECAPITULATION (q.v.) and morphology generally as bound up with those of comparative brain anatomy and morphology.

Literature: besides the titles mentioned, see MIND AND BODY, and the Psychological Index, in loc.; also MASCI, Il mater. psicofisico (1901). (J.M.B., G.F.S.)

Parallelogram of Forces: Ger. *Parallelogram der Kräfte*; Fr. *parallélogramme des forces*; Ital. *parallelogramma delle forze*. The law of composition of two forces acting on a point, expressed in this way: If two forces,



represented in intensity and direction by the lines *PF* and *PG*, act on a point *P*, the resultant will be represented in intensity and direction by the diagonal *PR* of the parallelogram *PGRF*. (S.N.)

Paralogism [Gr. *παρά* + *λόγος*, discourse]: Ger. *Paralogismus*; Fr. *paralogisme*; Ital. *paralogismo*. A REASONING (q.v.), especially a syllogistic reasoning, which is logically faulty and deceives the reasoner himself. Cf. FALLACY. (C.S.P.)

Paralysis [Gr. *παρά* + *λύσις*, a loosing]: Ger. *Paralyse*; Fr. *paralysie*; Ital. *paralisi*. The complete or partial loss of function of the neuro-muscular mechanisms. The term is preferably used for the loss of the power of movement.

Partial loss is called paresis. It may involve single muscles, or those supplied together by one or more nerves (with or without implication of the sensibility of the corresponding sensory surface), or one extremity, or both legs, or the movements of one side. Paralyses are usually distinguished symptomatically as organic and functional, by their nature as sensory and motor, and from the localization of the disorder as peripheral, spinal, infracortical, cortical, or psychic. The division into organic and functional (according to whether or not there is an anatomically demonstrable lesion) cannot be rigidly maintained, but is sufficiently well established for medical purposes. For these various forms see the textbooks on nervous diseases. Cf. MOVEMENT (disorders of).

When spoken of as a disease, paralysis is ordinarily used as a synonym of *general paralysis*, or general paresis, which is both historically and pathologically one of the most interesting of mental diseases. It was first described as a 'disease occurring among the insane,' a fatal complication of mania. The first descriptions of Bayle (1822 and 1825), Georget (1823), Calmeil (1826), and Parchappe (1832) maintain that it is a special disease from the beginning; the latter called it *folie paralytique*. Baillarger and Requin (1846 and 1847) taught that it was a combination of two diseases, the one affecting the motility, the other affecting the psychic organ. Delasiauve (1851) and Falret (1853) rehabilitated the view of Bayle and Calmeil, which is now universally accepted.

General paralysis is a disease-process which (like locomotor ataxia) is most probably to be regarded as a metasyphilitic degeneration of the nervous system, although the fact that in a certain number of cases the syphilitic origin is denied by the patient cannot be ignored. Alcoholism and unhygienic conditions of life generally are the chief secondary causes. Krafft-Ebing sums up the etiology with the words syphilization and civilization. Most cases occur between the ages of thirty and fifty, but cases during adolescence (probably hereditary syphilis) are not uncommon.

The fundamental characteristic of the disease is a rapid or slow progressive deterioration of memory, working capacity, and judgment, and profound change of character, with a more or less parallel development of tremor and ataxia, especially of speech and writing, and other signs of organic degeneration in the nervous system, and finally profound dementia, with more or less sensory and motor paresis. The entire sequence of symptoms from the first to the almost inevitably fatal ending covers a period of from six months or less to from four to six or more years, with an average duration of thirty-two months. These fundamental traits are frequently, but not always, connected with various accessory psychic symptom-complexes which appear in similar form also in other disease-processes. Hence we recognize a 'simple demented

course,' or a course with the appearance of extensive delusional fabrications and the performance of absurd enterprises and even criminal actions. Such abnormal conduct is due in part to the progressive defect of memory and of judgment; or it is a feature of an expansive excitement (in rare cases of depression), presenting the well-known megalomania in ideas of enormous wealth and strength, inventions, schemes, ability to raise the dead, &c., or delusions of the most abject misery; or it may begin like a case of paranoia, or as epilepsy. A further characteristic possibility is the occurrence of peculiar attacks of convulsions, or apoplectiform stupor. Hallucinations and truly depressive episodes are rare.

There is hardly a symptom or symptom-complex that will not occur occasionally in a case of general paralysis (see the enumeration of symptoms in Mickle's article in *Tuke's Dictionary of Psychological Medicine*); and the disease well illustrates the necessity of a distinction between the concepts disease-process and essential and casual symptoms (cf. Psychoses). Occasionally the downward course is arrested for some time, and in rather rare cases a complete remission occurs, leaving but little or no defect, so that it might represent a recovery if it did not end in the final fatal relapse with almost absolute certainty.

It should be noted that but few cases of syphilis develop into general paralysis. There is at present no adequate basis for explaining the course of the development of the disease in individual cases; why in one case of infection no further symptoms ensue, and in another, perhaps after six or more years, locomotor ataxia or general paralysis; and in the latter case, why the disease takes the spinal ataxic form (with early absence of knee-jerks) or the cerebral form (with exaggerated knee-jerk), or begins with epilepsy or attacks of transitory aphasia; or why it assumes an expansive, paranoic, or purely demented type.

Although pathological histology gives a clear picture of decay of nerve elements, and especially of increase of neuroglia and alteration of blood-vessels, there is still great difference of opinion as to which one (if any) of these lesions is the primary process; the diffuseness of the lesion over the whole nervous system makes it also quite difficult to establish even a parallelism between the lesion and the symptoms, except in the most general way. (A.M.)

Lesions of Paralysis. The causes of paralysis vary between wide limits. An inflammation of the spinal cord (myelitis) or of the peripheral nerves (neuritis) may produce an acute ascending (Landry's) paralysis in which control over the muscles of the legs, trunk, arms, and, finally, of the head, is progressively lost. In cases of sclerosis of the lateral columns of the cord a motor paralysis with increase of tendinous reflexes, known as spastic spinal paralysis, occurs.

Bulbar paralysis—of the motor centres of the medulla—results in interference in articulation, deglutition, and innervation of the face and eyelids. Degeneration and atrophy of the cells of origin of the glossopharyngeal and facial nerves, as well as atrophy of their root-fibres, are features.

Cortical paralysis due to injury or disease of the motor areas requires no other explanation. Purely functional motor and sensory paralyses in hysteria must be looked upon as cases of abnormal central inhibition allied to hypnotic disassociation. Lead poisoning and other intoxications give rise to localized peripheral paralyses, the aetiology of which is obscure.

General paralysis (dementia paralytica progressiva) is primarily a disease of the brain, and one in which characteristic lesions rarely fail to be developed. Syphilis is the most prominent cause. It is still a question whether the primary lesion is in the nervous, vascular, or sustentative (neuroglia) system, as all are affected. In the case of alcoholic paralysis the circulating medium is thought to form the point of departure. The vascular troubles begin with hyperaemia, which passes into an inflammatory condition of the walls. These are associated with degenerative changes in the specific nerve-tissue and proliferation and swelling (afterwards shrinking) of the sustentative apparatus.

While it seems to be true that the first demonstrable alterations in the nervous apparatus consist in destruction of the fine gemmules of the dendrites, it may be assumed that obscure changes are concomitantly taking place in the cell protoplasm. Soon well-marked foci of degeneration occur in the cell, and nodosities on the processes. The blood-vessels become distended and the walls thicken, and finally the adventiva cells proliferate, narrowing the lumen. Great dilation of the perivascular and pericellular lymph spaces is inaugurated. Inflammatory processes with exudation are found in late stages or acute cases and the meninges participate and become

adherent. The destruction of tissue is commonly greatest over motor regions (see Plate I, DEGENERATION). General paralysis may be inaugurated by spinal symptoms resembling tabes, sclerosis, bulbar paralysis, and neuritis.

Paraplegia: the destruction of the voluntary motor functions of both symmetrical halves of the body, usually of both the lower extremities.

Hemiplegia: a paralysis of voluntary motion of one side, usually as a result of softening of the cerebral motor centres. It is not necessarily complete.

Monoplegia: a paralysis limited to one limb or a single group of muscles.

Hemiparesis: an impairment (rather than complete paralysis) of the organs of voluntary motion of one side, or especially of the limbs.

Monoparesis: impairment of the power of single groups of muscles from focal brain lesions. (H.H.)

Psychic or mental paralysis; motor inability from mental causes (e.g. suggestion, hysteria, &c.). (J.M.B.)

Literature: MENDEL, Die progressive Paralyse der Irren (1880); VOISIN, Traité de la Paralysie générale (1879); MICKLE, General Paralysis of the Insane (2nd ed., 1886); KRAFFT-EBING, Die progressive allg. Paralyse, in Nothnagel's Handbuch, ix. Pt. II (1894, with good bibliography). (A.M.)

Paranoia [Gr. *παρά* + *νοῦς*, reason]: the same in the other languages. A term first used by Vogel (1772) and Heinroth (1818), and taken up by Kahlbaum (1863), to designate that form of partial insanity (see MONOMANIA) which throughout the course of the disease affects mainly the sphere of intellect.

Following Mendel and Morselli, the term has since been used to cover the expressions Verrücktheit (Griesinger, Sander) and Wahnsinn (Westphal), and by the Italians, Werner, and Ziehen, to include acute and chronic and simple and hallucinatory delusional insanity. Greater clearness has been attained by Tanzi, Wernicke, and Kraepelin, who return to the original chronic forms with systematization of the delusions.

The paranoic symptom-complex presents the following features:—In an apparently normal or, at least, rational individual some inadequate concepts may emerge while otherwise mental activity is normal; either a whim, a more or less erroneous delusional or overrated (dominant) view, or a hallucination or illusion, with the subjective value of a real sensation, or an autochthonous idea, i.e. a concept springing up in the patient's mind, but appearing strange though actual to him, not referred to a real afferent sensation or hallucination, but rather to some unaccountable spontaneity, outside influence, &c. ('somebody gives me bad thoughts'), or strange imperative concepts. When these new morbid factors are assimilated and become abnormally dominant, although they need not secure a deep influence on the valuation of other views by the patient, we speak of a paranoic condition, a state of mind unable to correct the delusion notwithstanding an otherwise reasonably critical attitude.

If the assimilation leads to distortion of formerly well-recognized relations, and to retrospective falsifications, we speak of a paranoic condition with systematization (Verrücktheit). When the new concepts are ushered in suddenly, often with a certain difficulty in the intellectual process of grasping things generally, the Germans speak of Wahnsinn, a term usually translated as acute delusional insanity, or perhaps better called delirium with orientation, i.e. with a fair realization of the bearings of surroundings. If, however, the new concepts (hallucinatory or otherwise) interfere with the orientation of the surroundings, and the elaboration also of ordinary impressions and their bearing, the term delirium is used.

In keeping with the nosological conceptions developed under the topics PSYCHOSES, MANIA, and MELANCHOLIA, the paranoic symptom-complex is not considered a disease-entity, except where the evolution of the disease gives it a specific character. What is described as acute paranoia (hallucinatory or not) is either an equivalent of the periodic manic-depressive insanity, or an equivalent of psychoses, which as often take the type of delirium (toxic or connected with infectious or exhausting conditions), or perhaps the beginning of a process of deterioration—dementia praecox or katatonia. In the midst of relative mental health, often with slight provocation, sleeplessness and a certain uneasiness appear, followed more or less promptly by hallucinations or delusions, such as that people are persecuting the patient with threats and slander, putting poison in his food, tormenting him with electricity, &c. Not infrequently the patient asks the police for protection; or in alcoholics, suspicions may appear as to the wife's faithfulness; noises occur in the house; the light and the position of the blinds are signs of some secret understanding, &c. Or

God or angels appear to the patient, saying 'Love one another,' 'Do your duty.' The patient begins to act strangely, is absorbed, but with it all he is capable of a fair grasp of the situation outside of his delusional sphere. The delusions may persist throughout the attack, with no systematization.

The true paranoic conditions are properly divided into: (1) paranoia proper, an abnormal development of the personality allied to constitutional inferiority (psychopathische Minderwertigkeit), many forms of which (folie de doute, &c.) might well be called rudimentary paranoia, remarkable for their persistence within definite lines of aberration and lack of tendency to pass into dementia or other forms of insanity. These forms are mainly a consistent elaboration of convictions (e.g. Magnan's folie des antivivisectionnistes) or traits of character. Some underrated genius with his invention of the perpetuum mobile, or the squaring of the circle, the kidnapped heir, the victim of Jesuits, the querulant who fights for his grievances until the courts recognize the morbid state of the complaint, or a Guiteau acting under inspiration, are well-known types. Apart from exacerbations of restless activity, and perhaps an occasional hallucination, there is always a complete system of correlation of even trivial facts, occasionally with additional falsifications of the past put together to demonstrate the fiendish machinations of open and secret persecutors or the evidence for noble birth, &c. The beginning of the disorder often points back to early youth and a self-conscious make-up, with suspicions of being observed, criticized, and an inclination to see meanings in trivial things (feelings and delusions of reference; or of interpretation, Beziehungswahn). Resignation in the unavoidable fate is often accompanied by rather absurd ideas of grandeur, but with little intellectual weakness.

(2) Paranoic conditions are types belonging to the group of processes of mental deterioration: dementia praecox, alcoholic deterioration, and especially the deterioration in the period of involution. It is on this ground that greatly varied hallucinatory and autochthonous forms most frequently develop, usually after the thirty-fifth year, and especially often in women shortly before the menopause.

On the basis of some prolonged physical or mental malaise, the patient begins to misinterpret trivial occurrences, hears an insulting voice, or has some unaccountable sensation, or gets a strange idea. Vague suspicion is thrown on people in the next house; the voice is referred to electric wires and telephones, or a strange sensation (frequently of a sexual nature) to hypnotism and mesmeric influence. Things which happened long ago receive their 'consistent' interpretation, and are elaborated in a delusional system, often with many retrospective falsifications; the patient develops an exaggerated feeling of importance, and frequently ends as queen, as god, as governor, &c., without any realization of the discrepancies in the situation, and with various degrees of dementia. Recovery is very rare, but some patients may be able again to return to a quiet existence outside of the hospitals.

In English and American hospitals these types are frequently called chronic mania or chronic delusional insanity.

Literature: WERNER, Die Paranoia (1891); WERNICKE, Die paranoischen Zustände (1896); MAGNAN, Recherches sur les centres nerveux, 2e série (Paris, 1883); Des Héréditaires dégénérés, 109–419; MAGNAN and SERIEUX, Le Délire chronique à évolution systématique (Paris); MORSELLI and BUCCOLA, Pazzia sistematizzata (1883); TANZI and RIVA, Paranoia (1884). (A.M.)

Paraphasia: see SPEECH AND ITS DEFECTS, V, (*a*).

Paraplegia: see PARALYSIS.

Parasite [Gr. *παράσιτος*, one who eats at another's table]: Ger. *Parasit*; Fr. *parasite*; Ital. *parassito*. An organism that lives in, or on, or at the expense of, another animal, called technically the host.

Familiar examples of external, or ecto-parasitic, animals are the flea and louse; of internal, or endo-parasitic, animals, the liver-fluke and tapeworm. Cf. DEGENERATION.

Literature: LEUCKART, Die menschlichen Parasiten, 2 vols.; VAN BENEDEN, Animal Parasites and Messmates. (C.S.M.–E.S.G.)

Pardon (in theology) [L. Lat. *per* + *donare*, to give]: Ger. *Vergebung*; Fr. *pardon*; Ital. *perdono*. The gracious act of God whereby he remits the penalty of sin on the repentance and faith of the sinner.

Pardon is an act of grace and mercy without regard to desert. Pardon remits the penalty but does not communicate any merit. For this reason it is to be distinguished from justification, which rests primarily on the imputation of the merit of Christ's obedience to the sinner.

Literature: DWIGHT, Theology; GRIFFIN, The Atonement. Also works on systematic theology. (A.T.O.)

Paresis [Gr. *πάρεσις*, a letting go, paralysis]: Ger. *Parese*; Fr. *parésie*; Ital. *paresi*. A partial or incomplete degree of PARALYSIS (q. v.); weakness in the use of a limb. (J.J.)

Parietal Organ: Ger. *Scheitelauge, Parietalauge*; Fr. *organe (ou œil) pariétal, pinéal*; Ital. *terzo occhio, occhio pineale*. An eye-like organ found in various vertebrates occupying a special fontanel in the dorsal median line of the skull; called also Parietal Eye, Pineal Gland, and Epiphysis.

The parietal organ is best seen in certain reptiles, in which it may even be functional. It arises as an evagination of the epiphysis (cf. BRAIN). The eye develops a retina and lens, and is connected with the roof of the diencephalon by the parietal nerve. The epiphysis itself seems to sustain much the same relation to the parietal eye that the optic evaginations do to the paired eyes. Authors are as yet not agreed as to the origin of the parietal eye and its relation to the epiphysis. Several recent authors have found evidence that the epiphysis and the parietal organ were originally paired. Locy especially reports paired rudiments of the epiphysis in selachians, yet this is questioned by the most recent writers (Eycleshymer and Davis, 1897).

Leydig (1872) and Spencer (1886) suspected the sensory character of the organ, and, though one recent author (Rabl-Rückhard) has assigned to it a function connected with the temperature sense, there is every reason to regard the epiphysis and parietal organ as a degenerate visual apparatus. The epiphysis itself is tubular in fishes, vesicular in amphibians, vesicular and glandular in reptiles, and glandular in mammals.

Literature: F. AHLBORN, Ueber die Bedeutung der Zirbeldrüse, Zeitsch. f. wiss. Zool., xl (1884); J. BEARD, The Parietal Eye in Fishes, Nature, xxxiv (1886); E. BÉRANECK, Ueber das Parietalauge der Reptilien, Jenaische Zeitsch., xxi (1887); Sur le nerf de l'œil pariétal, Arch. des Sci. Physiques, xxvi; J. CARRIÈRE, Neuere Untersuchungen über das Parietalorgan, Biol. Centralbl., ix (1889); EYCLESHYMER and DAVIS, The Early Development of the Epiphysis and Paraphysis in Amia, J. of Compar. Neurol., vii (April, 1897); FRANCOTTE, Recherches sur le développement de l'épiphyse, Arch. de Biol., viii (1888); H. W. GRAAF, Zur Anatomie und Entwickelung der Epiphyse bei Amphibien und Reptilien, Zool. Anz., ix (1886); B. F. KINGSBURY, The Encephalic Evaginations in Ganoids, J. of Compar. Neurol., vii (April, 1897); A. KLINCKOWSTROEM, Beiträge zur Kenntniss des Parietalauges, Zool. Jahrb., vii (1893); F. LEYDIG, Das Parietalorgan, Biol. Centralbl., x (1890); W. A. LOCY, The Optic Vesicles of Elasmobranchs, J. of Morphol., ix (1894); Contribution to the Structure and Development of the Vertebrate Head, J. of Morphol., xi (1895); MAGGI, Il terzo occhio nei Vertebrati, Riv. di Filos. Scient. (1890); PH. OWSJANNIKOW, Uebersicht der Untersuchungen über das Parietalauge, &c., Rev. d. Sci. Nat. St. Pétersbourg; A. D. SORENSEN, Comparative Study of the Epiphysis, &c., J. of Compar. Neurol., iv (1894); W. B. SPENCER, On the Presence and Structure of the Parietal Eye in Lacertilia, Quart. J. Microsc. Sci., xxvii (1886); F. C. STUDNICKA, Bull. de la Soc. Roy. de Sci. de Bohème (1893). (H.H.)

Parity [Lat. *paritas*, from *par*, equal]: Ger. *Gleichheit*; Fr. *parité*; Ital. *parità*. Equivalent to equality. *Parity of reasoning* is the precise analogy of two arguments both in their nature and in their force. (C.S.P.)

Parousia [Gr. *παρεῖναι*, to be present]: Ger. *Parusie*; Fr. *parousie*; Ital. *parusia*. (1) A semi-technical term used by Plato to express relationship between absolute being or essence and the sensible world. It is closely allied to his more specifically technical terms participation (*μέθεξις*) and community (*κοινωνία*). The world of sense has essence and existence only through the presence of the good in it (*Politics*, 509).

(2) It is employed as a technical term by Plotinus to express the relation of soul and body. The soul is not present in the body, but is rather present to it. More strictly, Plotinus says the body is present to the soul. Through this relation, sentience and vitality are rendered to the body. By parousia the soul thoroughly animates and permeates the body without getting in any way entangled with it (Plotinus, *Enneads*, vi. 4, 12).

(3) The term is used in early Christian thought to express the relation of the Holy Spirit to the individual and the Church. It is a matter of dispute whether this use is influenced by the technical philosophical discussions. (J.D.)

Paroxysm [Gr. *παροξυσμός*, irritation]: Ger. *Paroxismus*; Fr. *paroxysme*; Ital. *parossismo*. A sudden, violent, or spasmodic attack or exacerbation of a disease, or a group of symptoms.

The attacks of epilepsy, of hysteria, of mania, and other mental diseases are frequently of a paroxysmal character. The term

paroxysmal insanity is sometimes applied to a cerebral disturbance, probably epileptic in nature, in which attacks of insanity come on suddenly and are followed by variable intervals of almost normal mental conduct. Cf. EPILEPSY, HYSTERIA, and PERIODICITY. (J.J.)

Parsimony (law of) [Lat. *parsimonia*, frugality]: Ger. *Sparsamkeit*; Fr. *parcimonie*; Ital. *parsimonia*. Ockham's razor, i. e. the maxim 'Entia non sunt multiplicanda praeter necessitatem.' The meaning is, that it is bad scientific method to introduce, at once, independent hypotheses to explain the same facts of observation.

Though the maxim was first put forward by nominalists, its validity must be admitted on all hands, with one limitation; namely, it may happen that there are two theories which, so far as can be seen, without further investigation, seem to account for a certain order of facts. One of these theories has the merit of superior simplicity. The other, though less simple, is on the whole more likely. But this second one cannot be thoroughly tested by a deeper penetration into the facts without doing almost all the work that would be required to test the former. In that case, although it is good scientific method to adopt the simpler hypothesis to guide systematic observations, yet it may be better judgment, in advance of more thorough knowledge, to suppose the more complex hypothesis to be true. For example, I know that men's motives are generally mixed. If, then, I see a man pursuing a line of conduct which apparently might be explained as thoroughly selfish, and yet might be explained as partly selfish and partly benevolent, then, since absolutely selfish characters are somewhat rare, it will be safer for me in my dealings with the man to assume the more complex hypothesis to be true; although were I to undertake an elaborate examination of the question, I ought to begin by ascertaining whether the hypothesis of pure selfishness would quite account for all he does. (C.S.P.)

Part: see WHOLE AND PART.

Parthenogenesis [Gr. *παρθένος*, a virgin, + *γένεσις*, production]: Ger. *Parthenogenese*; Fr. *parthénogénèse*; Ital. *partenogenesi*. Development of a new individual from an ovum which has not been impregnated. It is a special form of asexual reproduction, and has been observed chiefly among arthropods (insects and crustacea). (C.S.M.)

The facts of parthenogenesis have long been known, and were discussed by Richard Owen, to whom we owe the term. They are illustrated by the male (drone) of the hive bee, which develops from an egg which is not fertilized, but otherwise resembles the eggs from which queens (fertile females) and workers (generally infertile females) are developed. Its origin and its connection with the phenomena of the maturation of the ovum and of the extension of the polar bodies have occupied much attention of recent years. Cf. ALTERNATION OF GENERATIONS, POLAR BODY, and AGAMOGENESIS. (E.S.G.)

The term 'artificial parthenogenesis' has been applied to recent results of artificial fertilization. E. B. Wilson (*Int. Monthly*, July, 1900) describes these results as follows:

'Foremost in interest stands the recent discovery of Loeb that the egg may be fertilized by chemical stimulus, without participation of the male element. The first definite experiments on the effect of chemical solutions on the egg were made by the Hertwig brothers thirteen years ago, and have been continued especially by Herbst, Richard Hertwig, Morgan, and Loeb. The experiments of Herbst, in particular, gave an almost startling revelation of the profound effect upon the egg produced by apparently insignificant alterations in the chemical environment. If, for example, the eggs of sea-urchins be allowed to develop in sea-water containing a very slight excess of potassium chloride, the development of the embryo is greatly altered, no skeleton is formed, and a larva results which, though living and vigorous, is of widely different form from the normal ones. If, in place of potassium chloride, lithium chloride be added to the water, the changes are still more remarkable, the embryo never infolding the cells which normally give rise to the alimentary canal, but developing, as it were, inside out. These monstrous forms are of course incapable of nourishing themselves, and ultimately perish; but the result is of high interest as opening the possibility of creating wholly new organic forms by varying slightly the conditions of development. The way for Loeb's discovery was paved by the experiments of Richard Hertwig and Morgan, who showed that if unfertilized eggs be treated by weak solutions of various substances, such as sodium chloride, magnesium chloride, or strychnine, they undergo some of the preparatory changes of division, and Morgan showed that they might actually divide, though without producing an embryo.

'In experiments carried on at the Woods Holl Biological Laboratory, Loeb finally succeeded in rearing large numbers of perfect larvae from eggs which, without fertilization, are first treated with a weak solution of magnesium chloride and then transferred to normal sea-water. Carried out under rigidly controlled conditions, these decisive experiments show that the egg is capable of complete development, without union with a spermatozoon, as a result of chemical stimulus; and they indicate that even in normal fertilization we must regard the stimulus to development as being given by a specific substance or substances carried by the spermatozoon. Loeb's highly interesting further experiments, together with the slightly earlier ones of Herbst, indicate that the normal equilibrium of the egg depends upon an equilibrium of chemical conditions in the protoplasm which is maintained by the conditions of the environment. The experiments give ground for the remarkable conclusion that the substances dissolved in the sea-water are individually poisonous to the egg, but are normally so balanced as to neutralize one another's injurious effects and maintain the equilibrium of the egg. If this armed neutrality be disturbed the egg responds, undergoing degenerative changes, and dying if the change be too violent, passing through an abnormal development and giving rise to monstrous embryos if the new conditions be less unfavourable, but under appropriate stimulus being, as it were, released from bondage, and rendered free to run its normal course of development.

'It is certain that new results of the highest interest, relating to the chemical conditions in living matter, may be looked for along the lines of research thus opened. One of the most interesting specific problems in this direction is the long-standing one of sex-determination. Experiments on insects, frogs, and rotifers have already given good ground for the conclusion that sex is in these cases determined by conditions of nutrition, which again in the long run are reducible to chemical conditions. The possibility is thus opened that we may yet succeed not only in fertilizing the egg by chemical means, but also in rendering the organism male or female by analogous methods. A highly interesting question, still undetermined, is whether organisms produced by artificial parthenogenesis, as above, are capable of reaching the adult condition and of further reproduction. Individuals thus produced lack the paternal nuclear material, and must possess but half the normal number of chromosomes. What the ultimate result of this deficiency may be is still a matter of conjecture.'

The statement ventured just above that 'individuals thus produced must possess but half the normal number of chromosomes,' has since been experimentally demonstrated by Wilson (*Proc. N. Y. Acad. Sci.*, 1901). (J.M.B.)

Literature: R. Owen, Parthenogenesis (1849); A. Brauer, Zur Kenntniss der Reifung des parthenogenetisch sich entwickelnden Eies von Artemia Salina, Arch. f. mikr. Anat., xiii (1893); von Siebold, Wahre Parthenogenesis (1856); T. H. Huxley, On the Agamic Reproduction of Aphis, Trans. Linn. Soc., xxii (1858); Y. Delage, Structure du Protoplasma, Biol. Gén. (1895). (C.Ll.M.)

Partial [OF. *parcial*, borrowed from the L. Lat. *partialis*]: Ger. *partiell*; Fr. *partiel*; Ital. *parziale*. Incomplete, or affecting a part.

Partial abstraction: the abstraction of one integrant part from others.

Partial cause: a cause which is joined with others of its own species in causing that which is caused.

Partial conversion: Aristotle's *ἀντιστρέφειν ἐν μέρει* is the conversion of a proposition, whether universal or particular, into a particular proposition.

Partial method: a method applying to a part of a science.

Partial term: a term of a proposition, such that not every object it denotes need be examined to verify the proposition (De Morgan, *Syllabus*, § 17). The *Century Dictionary* defines it as an undistributed term, which seems to come to the same thing. (C.S.P.)

Partial Tones: Ger. *Partialtöne*; Fr. *tons partiels*; Ital. *suoni parziali*. The simple constituents of a Compound Tone (q.v.), inclusive of the fundamental. Cf. Overtone, and Timbre. (E.B.T.)

Particular [Lat. *particularis*, singular]. In untechnical language, applied to single cases coming under general heads and occurring, or supposed to occur, in experience; in this sense it is also a substantive. The particulars are the experientially known circumstances of general nature, but as they appear in the individual case.

A particular Proposition (q.v.) is one which gives a general description of an object and asserts that an object to which that description applies occurs in the universe of discourse, without asserting that it applies to the whole universe or to everything in

the universe of a specified general description; as 'Some dragons breathe fire.' If we hold that the particular proposition asserts the existence of something, then the precise denial of it does not assert the existence of anything; as 'No dragon breathing fire exists.' It is, therefore, not true that from such precise denial any particular proposition follows, such as 'Some dragon does not breathe fire.' For if there is no dragon that does not breathe fire, this is false, although it may be true that there is no dragon that breathes fire. (C.S.P., C.L.F.)

This rule is not, of course, intended to apply to relative logic, in which there is frequently occasion to make a change from one copula to another—a change which is not contemplated in the ordinary logic. For instance, of the two propositions, 'Some woman is adored by every Catholic,' 'Every Catholic adores some woman,' the second follows from the first; to decide whether the first follows from the second or not, some further explicit convention as to the existence of terms which enter the proposition not as simple subject or predicate is necessary. (C.L.F.)

For instance, from the particular proposition, 'Some woman is adored by all Catholics,' it follows that 'Any Catholic that may exist adores a woman,' i. e. 'There is no Catholic that does not adore a woman,' which is the precise denial of 'Some Catholic non-adores all women,' which is a particular proposition. From this, in turn, it follows that a woman adored by all Catholics does not exist, which is the precise denial of the first proposition, 'Some woman is adored by all Catholics.' Of every particular proposition the same thing is true. Thus, if 'Some crow is white,' it follows that 'No inevitable consequence of whiteness is wanting to all crows,' which is the precise denial of the particular proposition, 'Some inevitable consequence of whiteness is wanting to all crows.' Thus, from every particular proposition follows the precise denial of a particular proposition, but from no precise denial of a particular proposition can any particular proposition follow. But this does not extend to a *simple* particular proposition, such as 'Something is white,' since to say 'Something is non-existent' (which the analogous treatment would yield) is an absurdity, and ought not to be considered as a proposition at all. (C.S.P., C.L.F.)

Particulate [Lat. *particulatim*, bit by bit. *Particularis* appears in Apuleius. *Particulatio* is used by Martianus Capella to mean breaking up into bits. *Particulare* and *particulate* are met with, not very often, in Albertus Magnus and others, to mean *to particularize*, *particularized*, whether in words or metaphysically of an essence]: (not in use in other languages). Particulate is used by recent writers chiefly in the sense of consisting of, or concerned with, particles. They appear to know nothing of the traditions of the word, but to have formed this adjective from *particle*, since *particular* bears a different meaning. (C.S.P.)

Party (in law) [Lat. *pars*, a part]: Ger. *Partei*; Fr. *partie*; Ital. *partito*. (1) A person directly concerned in a lawsuit, either as a plaintiff or a defendant.

(2) A person concerned in any legal transaction, e. g. a *party to a contract*, a party to a question in dispute. *Act of party*, a voluntary act, as distinguished from 'act of law.' Land is conveyed by act of party, inherited by act of law. *Party to the record*, a party to a lawsuit named as such in the written process or pleadings; *party in interest*, one not so named, but who has a beneficial interest in the subject-matter of the litigation. (S.E.B.)

Parva Logicalia [Lat.]. In scholastic logic the departments of that science go by the names of books. Thus, the *logica vetus* embraces what is treated in the 'predicables,' or introduction, of Porphyry, in Aristotle's *Categories*, and in the *Peri hermeneias*; the *logica nova* treats of the remaining subjects of the *Organon*; and finally the *parva logicalia* is the name at once of certain tractates and of the subjects treated in them—to wit, suppositio, relativa, ampliatio, restrictio, appellatio, distributio, exceptivae, reduplicativae, incipit et desinit, alienatio, exponibilia, consequentiae, syncategoremata, insolubilia, copulata, positio propositionum in esse, status, decensus et ascensus, obligationes, &c. (C.S.P.)

Pascal, Blaise. (1623–62.) Born at Clermont in Auvergne, and carefully educated in Paris, he very early developed remarkable abilities as a mathematician. About 1644, he came under the influence of the Jansenists of Port Royal. His attention was fixed chiefly on religion, morals, and philosophy for the remainder of his life.

Passion and **Passive** [Lat. *passio*, the trans. of Gr. *πάθος*, from *πάσχειν*, to suffer]: Ger. *Passivität* (*leidend*, *passiv*); Fr. *passion* (*passif*); Ital. *passività* (*passivo*). Generally passion is the condition of being acted upon of being affected, receptive; opposed to action. Passive is the corresponding adjec-

tive. Technically, it has its philosophical meaning as one of the ten categories of Aristotle (*Topics* and *Categories*). See CATEGORY.

According to the theory of Trendelenburg that the categories correspond to distinctions of language, this category is derived from the passive voice of the verb. In the *Metaphysics* (xiv. 2) Aristotle generalizes the categories under three heads—essences, attributes (*πάθη*), and relations. As attribute, the 'passion' describes what flows not from the essence or substance of the thing itself, but from the way it is acted upon by other things. Thus it comes to mere attribute in general, apart from its passive connotation. Hence the chief importance of the concept historically is in connection with the discussion of the nature of SUBSTANCE (q.v.). Among the Scholastics, the relation of the *passiones entis* to *ens* was a matter of dispute; the Thomists holding that they are real, not simply something attributed to being by thought, and are one in nature with Ens itself; while the Scotists hold that they are real, but yet, by the nature of the thing, totally different from Ens or being; while others asserted that they were the results of thought. In modern thought the term is practically given up. Cf. AFFECTION, ACCIDENT, MODE, PROPERTY, and QUALITY. (J.D.)

Passion (in psychology): Ger. (1) *Affekt*, (2) *Leidenschaft* (Kant); Fr. *passion*; Ital. *passione*. (1) Strong and uncontrolled emotion.

(2) Strong and uncontrolled emotional disposition; so strong as to exclude or overpower other mental tendencies, and to give rise on occasion to uncontrolled emotions, i. e. to passions in sense (1). Cf. EMOTION, and SENTIMENT.

In sense (1) we speak of 'flying into a passion,' or of a passion of grief. The passion may be due either to general deficiency in the power of self-control, as in the case of children; or to the exceptional violence of emotion which sets self-control at defiance; or to violence combined with a suddenness which does not give time for self-control to be effectively exercised. In sense (2) we speak of carnal passion (though this represents a rather special usage), a 'passion for music,' of passionate devotion to truth, and so on.

Literature: JESSEN, Versuch ü. Psychol., 296 (where the above distinction is made). See the textbooks of psychology generally, and the citations under EMOTION, and SENTIMENT. (G.F.S.–J.M.B.)

Past Time (apprehension of): Ger. (*Bewusstsein der*) *vergangenen Zeit*; Fr. (*connaissance du*) *temps passé*; Ital. (*coscienza del*) *tempo passato*. The time of an event apprehended as having come before the present moment of consciousness.

The series of past events is marked by determinateness and fixity; and especially by the inability of the subject to exercise practical control over it. See TIME (cognition of), also for literature; and cf. PRESENT, and FUTURE.

Earlier writers in general regard the reference of an event to past time as an ultimate and inexplicable fact of consciousness, and connect it with the existence of an ultimate faculty of memory. Herbart was the first to explain it as the result of a complex ideal construction. See Bradley, art. on Memory and Inference, *Mind*, N.S., 30 (April, 1899). Cf. LOCALIZATION (in time). (G.F.S.–J.M.B.)

Pastoral Stage: see SOCIALIZATION.

Pathology (mental) [Gr. *πάθος*, disease, + *λόγος*, discourse]: Ger. *Pathologie* (*des Geistes*), *Psychopathologie*; Fr. *pathologie mentale*; Ital. *patologia* (*mentale*), *psicopatologia*. The broadest and in many respects most scientific and suggestive use of the term pathology regards it as coextensive with normal in biology; the latter applies to normal life in all its variety and complexity, the former to that of the morbid, the diseased, and the abnormal in no less extensive and comprehensive a sense.

There would thus be a genetic pathology as there is a genetic biology; anatomy, physiology, psychology, sociology present pathological as well as normal aspects. In medicine, pathology is frequently used in a more specific sense (such use, however, being regarded as unwarranted by many medical writers) to refer to the diseased forms of structure associated with given diseases; this is more precisely termed pathological anatomy. There is a further distinction in medicine between general and special pathology, the disorders of general features of organic life, and of special mechanisms.

The study of the psychological manifestations of disease may be termed mental pathology or psychopathology; it is frequently used as equivalent to the study of seriously abnormal states, and of the conditions which give rise to them. The synonyms Medical Psychology and Psychological Medicine vary somewhat in connotation, and are not free from unfortunate usage. Psychiatry refers to that division of mental pathology which is related to insanity.

Abnormal Psychology is a more general synonym, for the exact scope of which see that term. The science of nerve diseases is called Neuropathology. Cf. the terms referred to.

Literature: the textbooks of mental diseases; special topics, sub verbis; also BIBLIOG. G, i, *g*; for titles after 1893 consult the Psychological Index, i. ff. (J.J.)

Pathos (1) and (2) **Pathetic** [Gr. *πάθος, παθητικός*, passion, feeling]: Ger. *Pathos, pathetisch*; Fr. *pathos, pathétique*; Ital. *patos* (E.M.), *patetico*. (1) Literally, the more transitory and passive experiences of life, as contrasted with ethos (*ἦθος*), the more permanent and active dispositions and character. More definitely, the quality of certain human experiences which present limitation or suffering under such conditions as to evoke not only pity and sympathy, but also aesthetic feeling.

The conditions which are the ground of the aesthetic value seem to be (*a*) the, in some sense, admirable or pleasing character of the experiences, which show affections, passions of the more contained sort, or hopes and aspirations; (*b*) the consequent sympathy (cf. HUMOUR), and possibility of recognizing oneself in the experience (Einfühlung); (*c*) the contrast, especially as in the favourite Greek situation of the individual in hopeless limitation under laws of destiny. It differs from the tragic as presenting rather a negative or passive than an active collision, and also in that the tragic implies an element of magnitude (according to some, of sublimity), whereas pathos may be found in the small as well as in the great. Hegel used the term to signify the passions as the moving forces of human life, though without the undesirable aspects often implied in the word Leidenschaft.

(2) Having pathos; expressing or evoking passion or tender feeling. A slighter word than pathos, and often used in a depreciatory sense as implying a rhetorical artifice to secure an emotional effect, instead of meaning an actual representation of genuine feeling. This depreciatory sense attaches to the German pathetisch (hence rührend, moving, touching, is usually employed in its stead) and to the French pathos, while the German Pathos and the French pathétique are used in a good sense. Cf. TRAGIC, and HUMOUR.

Literature: HEGEL, Werke, x. 291 ff.; VISCHER, Aesth., i. 265 ff.; KÖSTLIN, Aesth., 187; HARTMANN, Aesth., v. 1 (i); SCHILLER, Aesth. and Philos. Essays, 'The Pathetic.' (J.H.T.)

Patriarchate [Gr. *πατήρ*, father, + *ἀρχός*, ruler]: Ger. *Patriarchat, Vaterherrschaft*; Fr. *patriarcat*; Ital. *patriarcato*. A family, clan, or village community ruled by its eldest male, from whom, usually, most of the other males, and half or more of the females, are descended.

This term (or its equivalent in older languages) has been in use from prehistoric times. The Book of Genesis describes the early Hebrew polity as patriarchal. Aristotle (*Politics*) derives all human society from the patriarchal family. The word obtained its modern exact meaning in ethnology and sociology through the controversy between Henry Sumner Maine (*Ancient Law* and *Early Law and Custom*) and J. H. McLennan (*The Patriarchal Theory*). (F.H.G.)

Patristic Philosophy: Ger. *patristische Philosophie*; Fr. *philosophie patristique*; Ital. *filosofia patristica*. (1) The philosophy of the Christian era falls readily into three periods, commonly designated as patristic, scholastic, and modern. The patristic philosophy, in its broadest acceptation, is contemporaneous with the rise of Christianity, and extends to the death of Gregory the Great in the West (604) and of John Damascene in the East (755).

(1) In reality the patristic movement spent itself much earlier, with Augustine (d. 430) and Cyril of Alexandria (d. 444) as its culminating spokesmen. An epoch of encyclopedism, in which a number of writers (Capella to Alcuin, 430–804) stand out rather as depositaries of secular and Christian learning than as originators of new lines of thought, marks the decline of patristic philosophy and the transition to the scholastic movement, which starts with Erigena in the first half of the 9th century.

Literature (to 1): besides the general works on the history of philosophy of UEBERWEG, HAFFNER, ERDMANN, and WINDELBAND, which treat this period incompletely and not always with accuracy, the following bibliography embodies a fuller presentation of the patristic field. MÖHLER, Patrologie (Regensburg, 1840); RITTER, Christl. Philos. (Hamburg, 1841; Göttingen, 1858–9); FESSLER, Instit. Patrologiae (2 vols., to Gregory the Great; Innspruck, 1850–1, 1890–2); NEANDER, Christl. Dogmengeschichte (Berlin, 1851); STÖCKL, Gesch. d. Philos. d. patristischen Zeit (Würzburg, 1859); Gesch. d. christl. Philos. z. Zeit d. Kirchenväter (Mainz, 1891); HUBER, Die Philos. d. Kirchenväter (Munich, 1859); W. MÖLLER, Gesch. d. Kosmologie in d. griechischen Kirche bis auf Origenes (Halle, 1860); WERNER, Gesch. d. apologetischen

u. polemischen Litteratur d. christl. Theol. (Schaffhausen, 1861); DONALDSON, A Critical History of Christian Literature and Doctrine (3 vols., London, 1865–6); ALZOG, Grundriss d. Patrologie (Freiburg, 1866–88); NIRSCHL, Lehrb. d. Patrologie u. Patristik (3 vols., Mainz, 1881–3–5); SCHWANE, Dogmengeschichte der vornicaenischen Zeit; der patrist. Zeit (Münster, 1862–9); HARNACK, Lehrb. d. Dogmengeschichte (Freiburg i. B., 1890); Gesch. d. altchristl. Litteratur, bis Eusebius, Pt. I (Leipzig, 1893 ff.).

The intrusion of the personal equation and of pre-accepted theories colours the interpretations of most writers on this period. The necessity, therefore, of criticizing one's categories and of avoiding too much simplification and condensation in one's reconstructive analyses should be borne in mind during a study of the above bibliography. To form an objective estimate of the patristic writings, disinterested textual study is indispensable. See BIBLIOG. A, i, *d*, and A, 2, sub nomen.

(2) Christianity as a new and distinct religious principle struggled from the beginning against both Jewish and Gentile efforts to absorb its doctrinal and ethical content. Confronted by the aristocratic separatism of the paganizing Gnostics on the one hand, and by the racial exclusiveness of the Jews on the other, Christianity had soon perforce to determine its relations to the Judaic and pagan past, and to assume a definite attitude towards the complex philosophic problems to which, indirectly at least, it had given rise. The necessity of thus setting forth its position against Jews and Greeks, Gnostics and Neo-Platonists, Judaizers and heretics, quite naturally at first with the Apostolic Fathers took the form of letters in which the theoretical and practical content of Christianity is exposed and defended. Quite naturally at first also we meet a period of Apology negative in character as regards the reigning philosophies, and intent only on showing forth the Christian faith as the sole true philosophy, and for this reason worthy of credence and undeserving of persecution. The three great struggles of early Christianity against the ethical, religious, and sectarian bias of the pagan world, thus gave a moral, apologetic, and polemic character to the Christian literature of the first three centuries. To its contest with the rejuvenated theories of the earlier Eastern religions, patristic philosophy owes its spur to systematic development. See GNOSIS.

Literature (to 2): the following works present a full view of the Gnostic and Neo-Platonic tenets: NEANDER, Genetische Entwickelung d. vornehmsten gnostischen Syst. (Berlin, 1818; Eng. trans. by Torrey, Boston, 1865); MATTER, Hist. critique du Gnosticisme (Paris, 1828–43); MÖHLER, Ursprung d. Gnosticismus (Tübingen, 1831); FRANCK, Syst. de Kabbale (Paris, 1842); KIRCHENER, Die Philos. d. Plotin (Halle, 1854); RICHTER, Neuplatonische Stud. (Halle, 1864–7); HOLZMANN, Judenthum u. Christenthum (Leipzig, 1867); MANSEL, The Gnostic Heresies (London, 1875); OVERBECK, Ueber die Anfänge d. patristischen Litteratur, Hist. Zeitsch. (1882); DRUMMOND, Philo-Judaeus, or the Jewish Alexandrian Philos. in its Devel. and Completion (2 vols., London, 1888); ZELLER, Die Philos. d. Griechen, 3. Theil, 2. Abth., 419–865 (3rd ed., Leipzig, 1881). In SCHAFF's History of the Christian Church (i. 221–51), Gnosticism receives full treatment, and in the Encyc. Brit., art. Neo-Platonism, the exposition of this subject by HARNACK may be consulted.

(3) The apologetic of the Apostolic Fathers soon lost its negative character as regards the reigning philosophies. After the efforts of the Gnostics to construct a philosophy of Christianity and to square faith (*πίστις*) with knowledge (*γνῶσις*) by means of fanciful world-views had abutted on failure and resulted only in divers systems of theosophy and mysticism, a double reaction took place. Some minds, looking upon the Gnostic failure as a clear indication of the worthlessness of all philosophy not Christian, and as a decisive forecast of the final outcome of all attempts to reconcile Christian with pagan thought, were more or less hostile to the introduction of the rational element into the Christian mental life. Others favoured a renewed effort at reconciliation, and set themselves to the task accordingly. And thus the necessity of determining the points of contact between Christian doctrine and Hellenic culture divides the thought of the first four centuries into two schools—the African and the Alexandrian—according to the respective attitudes of hostility or friendliness assumed towards the incorporation of pagan philosophy.

The usual partition of patristic philosophy into the Ante-Nicene and the Post-Nicene periods—the former characterized as a period of *genesis*, the latter as a period of *elaboration*, of the dogmas defined by the Council of Nice (325)—has the faulty feature of not bringing out with distinctness the formative

lines of thought. A more philosophical division is the Rise (period of Apostolic Fathers, extending to 150 A. D.), Development (period of Apologists, 150–325), Culmination (from Council of Nice, 325, to St. Augustine's death, 430), and Decline (period of Encyclopedists, 430–804). In this division the African and Alexandrian schools, the latter especially, receive historical setting as factors of development. A usual subdivision—that of the Antiochian school, which adopted an attitude midway between the Alexandrian and the African—has significance rather for the history of theology than of philosophy.

(4) The African school, so designated because the spirit of hostility to pagan philosophy manifest in the Apologetic writings reached its fullest expression in Tertullian and Arnobius, both Africans, may be said to include all the earlier Apologists with the noteworthy exceptions of Justin and Athenagoras.

Tatian, in his λόγος πρὸς Ἕλληνας (160–70 A. D.); Theophilus of Antioch, in his work πρὸς Αυτόλυκον (cir. 182); Hermias, in his διασυρμὸς τῶν ἔξω φιλοσόφων (after 200); Irenaeus, in his ἔλεγχος καὶ ἀνατροπὴ τῆς ψευδωνύμου γνώσεως (cir. 180), and Hippolytus, in his ἔλεγχος κατὰ πασῶν αἱρέσεων (223–35), oppose all rapprochement of Christian thought with pagan wisdom, and hold the philosophy of the Greeks in high disfavour, the attitude of Tatian and Hermias amounting to supreme contempt. This anti-synthetic tendency received its most classical expression in the works of Tertullian, Minucius Felix, Arnobius, and Lactantius. (*a*) Tertullian, presbyter of Carthage (160–220), a lawyer previous to his conversion (197), and afterwards a Montanist (202), is outspoken in his denunciation of all philosophers, whether of the Academy or the Porch: the true Porch is that of Solomon, and the Greek philosophers are the patriarchs of the heretics. Christ and the Gospel have made all further inquiry futile. In his celebrated formula 'Credo quia impossibile' (*De Carne Christi*, cap. v) he gives trenchant expression to his views. Windelband and many critics, on the strength of this passage, classify him as anti-rational. But a more careful study of his works (*De fuga in persecutione*, cap. iv; *De Baptismo*, cap. ii; *Apologet.*, cap. xvi; and the *Testimonium Animae*, in its entirety) furnishes a better focus for determining his standpoint than the above detached formula, which, in the light of the several passages indicated, reduces itself to an extravagant burst of oratory and an *argumentum ad hominem*. A more critical estimate, while still leaving him violently opposed to the encumbrances of pagan philosophy, would not go the length of making him out anti-rational. (For a good textual study on this point, see *La Revue Catholique*, i. 485 ff., 1869; *Étude philos. sur Tertullien*, Laforêt.) His chief works of philosophic relevancy are: *Adversus Marcionem* and *Adversus Praxeam*, for theodicy; *De Anima*, *De Resurr. Carnis*, *De Carne Christi*, for anthropology and psychology; *Adversus Marcionem*, *Adversus Iudaeos*, *De Monogamia*, *De Pudicitia*, *De Ieiunio*, *De Resurr. Carnis*, for ethics. The brief *résumé* of his doctrine furnished by Ueberweg (i. Pt. II. 303–6, Eng. trans., N. Y., 1894) is inaccurate (304) in ascribing to him a belief in the total depravity of the human mind and will (see Laforêt, loc. cit.). (*b*) Minucius Felix, who lived towards the end of the 2nd century, expresses in his *Octavius* many ideas suggestive of Tertullian. He opposes the polytheism of the popular faith in a graceful portrayal of the divine Omnipresence, and ascribes rather to plagiarism from the Old Testament than to native ability in reasoning whatever speculative truth is to be found in the systems of Plato and Pythagoras. (*c*) Arnobius, in his work *Adversus Gentes* (after 300), develops more fully the thesis of Felix. His low estimate of the powers of human reason may be gathered from his statement, made in refutation of Platonic pre-existence, that a man isolated from birth would acquire no knowledge transcending sense, and show no signs of intellect. (*d*) Lactantius, the Christian Cicero and contemporary of Arnobius, devotes the third book of his *Institutiones Divinae* to proving the nullity of all philosophy. Revelation alone leads to truth. Less hostile than Tertullian, he admits that the fragments of truth scattered through the pagan schools would, if pieced together, yield an organic body of doctrine in accord with Christian faith, but proclaims the impossibility of such an eclectic piece of work without divine aid and teaching. His other extant works of import are: *Liber de opificio Dei*, *De ira Dei liber*, *De mortibus persecutorum*.

Justin and Athenagoras did not share these extremist views as to the depravity of pagan philosophy. Justin, who died about 166, is the first Apologist whose works have come down to us. In his first Apology (ἀπολογία πρώτη ὑπὲρ τῶν Χριστιανῶν, 147) and in his second (πρὸς τὴν Ῥωμαίων σύγκλητον, about 150)

he shows friendliness to Greek philosophic endeavour. The divine Logos illumined the Greeks, enabling them in a measure to see the truth, which exists wholly and completely in the incarnate wisdom, Christ. His διάλογος πρὸς Τρυφῶνα Ἰουδαίον, besides a vindication of the divinity of the Logos, contains his eschatological views. The *Exhortation to the Greeks* (λόγος παραινετικὸς πρὸς Ἕλληνας), of doubtful authenticity, asserts Greek familiarity with Old Testament writings, and repudiates the Greek myths respecting the Deity. Athenagoras, in his Apology (πρεσβεία περὶ τῶν Χριστιανῶν, 176–7) addressed to Marcus Aurelius, defends the Christians against the threefold charge of atheism, immorality, and Thyestian feasts, exposes the Christian conception of God, and quotes the Greek poets and philosophers in favour of monotheism. In his *Resurrection of the Dead* (περὶ ἀναστάσεως τῶν νεκρῶν) there is a good portrayal of patristic anthropology too often overlooked. Athenagoras is a pleasing, cultured, and methodical writer. His Apology (chaps. viii, ix) contains an original *a priori* proof for the existence of God.

Literature (to 3 and 4): the reconstruction of this period will be greatly facilitated by a critical use of the following special works, in addition to those already enumerated: Les Apologistes chrétiens au second siècle (Paris, 3rd ed., 1888); Daniel, Tatian d. Apologet (Halle, 1837); Böhringer, Die Kirche Christi, &c., Irenaeus, 271 ff. (Zürich, 1861); Volkmar, Hippolytus u. die römischen Zeitgenossen (Zürich, 1855); Aubé, Saint Justin, martyr et philosophe (Paris, 1881); Gildersleeve, The Apologies of Justin Martyr, &c. (N. Y., 1877); Schubrung, Die Philos. d. Athenagoras (Berlin, 1882); Laforêt, Rev. Catholique, Athénagore, &c., ii. 198–215 (1871); de Felice, Étude sur l'Octavius de Minucius Félix (Blois, 1880); cf. also Jahrb. f. prot. Theol., 485–506 (1881), 168–78 (1882); J. des Savants, 436–53 (Paris, 1883); Gebhardt, Harnack, Opera Patrum Apostolicorum (Leipzig, 1876–7); Funk, Doctrina Patrum Apostolicorum (2 vols., Tübingen, 1881–8); Röhricht, Seelenlehre d. Arnobius (Hamburg, 1893); Steuer, Die Gottes- und Logoslehre des Tatian (Leipzig, 1893); Werner, Der Paulinismus des Irenäus (Leipzig, 1889); Kunze, Gotteslehre des Irenäus (Leipzig, 1891); Kühn, Der Octav. des Min. Felix (Leipzig, 1882); cf. Theol. Litterar-Zeitung (No. 6, 1883).

(5) Thus the greater part of the Apologists held aloof from any synthetic attitude towards Greco-Roman philosophy, emphasizing spontaneous belief rather than rational investigation, and setting forth the Christian ethics as well as the ideas of God, personality, and immortality in sharp and distinctive contrast with the corresponding pagan notions. The underlying *motif* with all the Apologists was a rational justification of divine Providence. The African school sought its proofs in the utter ineffectiveness of Greek philosophy; the Alexandrian, influenced by the larger view that God was the source of natural as well as of revealed truth, regarded Greek philosophy as a preparatory introduction to Christianity.

The Alexandrian school, which succeeded to the conciliatory spirit of Justin and Athenagoras, deserves the credit of having imparted a new and vigorous impulse to the entire patristic movement, along the neglected lines of incorporation and synthesis. Founded by Pantaenus about 180 A. D., it was throughout as friendly to the rationalizing spirit as the African school was hostile. (*a*) Clement of Alexandria (150–220) states in his *Stromata* that philosophy is twofold—the Christian, which proceeds directly from God, and the Greek, which comes indirectly through human reason from the same source. Philosophy was a sort of Testament to the Greeks, as the law to the Hebrews, both being preparations for Christianity. Sharing the views of Justin, he limits the faultiness of Greek philosophy to its partial, incomplete truths, and recommends a criterion (agreement with Christian belief) whereby the true may be sifted from the false in Hellenic science; likening those who would dispense with dialectic in theology to 'a man who would fain gather grapes without cultivating the vine.' The Christian should advance from faith to knowledge. Faith is not blind, reason not all-sufficing. The true Gnostic is the Christian Gnostic, such as St. James, St. Paul, and St. John, illumined by the Logos and ever acting from love. An eclectic, adhering to no school in particular, he developed two noteworthy ideas—the Christian Gnosis and the Christian criterion. The *Stromata* of Clement embodies the first rough attempt at a systematic Christian philosophy. His works of importance are: the *Stromata*, for the Gnosis; *Paedagogus*, for ethics; and the Λόγος προτρεπτικὸς πρὸς Ἕλληνας, against the absurdities of Paganism. (*b*) Origen (185–254), a disciple of Clement, pieced together into an orderly whole the fragmentary teaching

of his master. While denying the identity of pagan thought and Christian revelation, he endeavoured to effect their union by rejecting 'only the captious ignorance of the philosophers.' In his method of presenting Christian doctrine, he anticipates the Schoolmen. He admitted an indefinite series of worlds, and denied all fixity of reward or punishment. He was the first to formulate the distinction *παρὰ φύσιν* and *ὑπὲρ τὴν φύσιν* (*Contra Celsum*, v. 23, 24). His deep reading in Philo gave him an extravagant sense of the allegorical which he applied to the interpretation of Scripture. His chief works are the *Stromata*, *Contra Celsum*, and *De Principiis*.

Literature (to 5): the literature bearing on the Alexandrian school is abundant. The following treat the subject-matter at length: Vacherot, Hist. critique de l'École d'Alexandrie (3 vols., Paris, 1846–51); Simon, Hist. de l'École d'Alexandrie (2 vols., Paris, 1844–5); Matter, Sur l'École d'Alexandrie (Paris, 1840–8); de Faye, Clément d'Alexandrie (Paris, 1898); Freppel, Clément d'Alexandrie (Paris, 1866); Merk, Clemens Alex. in seiner Abhängigkeit v. d. griechischen Philos. (Leipzig, 1879); Redepenning, Origenes, sein Leben u. seine Lehre (2 vols., Bonn, 1841). A good study of Origen's philosophy by Laforêt may be found in the Revue Catholique, i. 685–705; ii. 123–39, 255–73, 545–72 (1870). Reville, Le Logos d'après Philon d'Alex. (Geneva, 1877); Denis, De la Philos. d'Origène (Paris, 1884).

(6) The Alexandrian school fixed the synthetic tendency in Christian thought. It introduced the Platonic element, to which the Aristotelic (by Philoponus, who wrote 500–70) and the Neo-Platonic (by Augustine and Dionysius the Areopagite) were also added in the course of the struggle against heresy and in the repeated endeavours to express the Christian dogmas in terms of reason.

In the period of culmination we meet the names of Eusebius (d. 340), Athanasius (d. 373), Basil (d. 379), Gregory of Nazianzen (d. 390), Gregory of Nyssa (d. 395), Cyril of Alexandria (d. 444), Augustine (354–430), Nemesius (wrote 400–50), and Dionysius the Areopagite. We treat only those who have special significance for the development of philosophy. (*a*) Gregory of Nyssa, in his *Dialogue with his sister Macrina concerning the Resurrection*, shows the first clear attempt at a parting of the ways between philosophy and theology—a problem which did not become fully actual until the 13th century. In his *Λόγος κατηχητικός* the presentation of Christian doctrine is far more orderly and thorough than that of Origen. His disquisitions on creation show freshness and originality. In his discussion of the Trinity he anticipates the mediaeval difficulties attending the application of dialectic to theology. His introduction of the philosophic and scientific elements into the exposition of Christian doctrine marks an advance over Clement and Origen. His anthropology is contained in his work on creation, and his eschatology in the above-mentioned dialogue. (*b*) Saint Augustine, the master mind of patristic philosophy, was born at Tagaste, 354, and died bishop of Hippo Regius, 430. The philosophic element, prominent throughout all his writings, is to be found more especially in the following works, which serve as a basis for the reconstruction of his views: *Contra Academicos* (386), *De Beata Vita* (386), *De Ordine* (386), *Soliloquia* (387), *De Immortalitate Animae* (387), all composed before his baptism; *De Quantitate Animae* (388), *De Utilitate credendi* (391), *De Duabus Animabus contra Manichaeos* (391), *De Libero Arbitrio* (388–95), *Confessiones* (400), *De Genesi ad Litteram* (401–15), *De Trinitate* (400–16), *De Anima et eius origine* (419), *De Civitate Dei* (413–26), and the *Retractationes* (427). In the *Retractationes* Augustine reviews his entire writings, and withdraws many of his previous opinions.

Philosophy, with St. Augustine, is a diligent inquiry into things human and divine, in so far as conducive to blessedness of life. Though good in itself, philosophy cannot direct man to salvation, and is therefore inferior to Christian truth. Whether moral, rational, or natural, its object is the soul and God—no more, no less. Its methods are authority and reason. Authority and faith precede all scientific investigation and reflex knowledge. Faith is superior to letters and philosophy, although nourished and strengthened by both. The Neo-Platonists approached nearest to speculative Christian truth, but were ashamed to leave the school of Plato for that of the fishermen. To combat scepticism, St. Augustine proceeded along lines anticipatively Cartesian—the impossibility of doubting one's own existence, and the implication of the fact of one's existence in the very possibility of one's being deceived. Thought and the existence of the thinker are the most certain of all things. Intellect is the true constituent of science. Sense-perceptions are true in them-

selves, but their content may be misinterpreted by reason. The soul is a substantial, spiritual, immortal principle of knowing, willing, and remembering. Its immediate creation is a matter not to be pronounced upon, because of the existence and transmission of original sin. God is One—the container of all intelligible truth, and of Plato's world of archetypal ideas. He is known rather as surpassing all categories than as expressible in them. He is the Creator, Upholder, Provider, and Predestiner. He is not the author of evil, which is only a privation of good brought about by free and defectible creatures. Evil has only a deficient, not an efficient cause; whence the absurdity of Manichaeism. God is Triune; and his trinal personality as well as substantial unity may be feebly understood from the analogy of memory, thought, and love in the human soul. The first man fell from his high estate. Original sin, which is a privation of original justice, affected the entire race and weakened man's power of will. After establishing the freedom of the will ('De libero Arbitrio,' throughout), St. Augustine reduces it to the vanishing point in his Pelagianic controversies and in nearly all his later works (Nourrisson, *Philos. de Saint-Augustin*, i. 413–83), because of his attempt to reconcile its admission with the doctrines of Grace and Predestination. In the work *De Civitate Dei* the history of the Israelites and of the divine Commonwealth is set forth as a basis for the true philosophy of history. In harmonizing the various thought-tendencies of his day and of antecedent times; in imparting to patristic philosophy its first relatively complete systematic development; in attempting a definite parting of the ways between philosophy and theology; in his fruitful refutation of academic doubt; and in his vigorous outline of a philosophy of history, St. Augustine is the leading figure of patristic thought and the teacher of the middle ages. The sources upon which he drew for information were naturally Greek and Latin. He had considerable knowledge of Plato, notably of the *Timaeus*, and adopted Plato's theory of ideas. But the Platonism upon which he drew was the Alexandrian Neo-Platonism of Plotinus, Porphyry, and Iamblichus, gathered from the translations of the rhetorician Victorinus, and not from original documents. His defective knowledge of Greek, and his exclusive study of Plato in the Neo-Platonic writings above mentioned, led him to group Plato and Aristotle, Academicians and Peripatetics, Platonists and Neo-Platonists confusedly together, without so much as a suspicion of their divergent view-points. This lack of acquaintance with original sources accounts for the extravagant estimate which he entertained of Neo-Platonism; it accounts also for his inaccurate portrayal of Gnosticism and Manichaeism in particular, and of the Eastern religions in general. His knowledge of the Greek Fathers was obtained through the Antiochian school, whose methods, views, and arguments respecting the explanation of the Trinity he repeats with a striking similarity that is indicative of the fusion of Greek and Latin thought-currents (Régnon, *Études de Théol. positive sur la Sainte Trinité*, iii. 142 ff., 1898). Besides this indirect conversance with Hellenic science, St. Augustine was greatly indebted to Latin thought for much of his knowledge. Vergil, Lucretius, Horace, Terence, Persius, and Juvenal among the poets; Cicero, Seneca, Appuleius, Varro, and Aulus Gellius among the prose writers, were drawn upon extensively. Of the Latin Fathers, Tertullian, Lactantius, and Ambrose were chiefly instrumental in his formation; not to mention the crowning influence of all, which was that of the Scripture, and especially of St. Paul's writings.

Literature (to 6, St. Augustine): a good critical study of St. Augustine is Nourrisson, Philos. de Saint-Augustin (2 vols., Paris, 1865). Consult also: Bindemann, Der heilige Augustinus (3 vols., i. Berlin, 1844; ii. Leipzig, 1856; iii. Greifswald, 1869); Dupont, La Philos. de Saint-Augustin (Louvain, 1881); Storz, Die Philos. des hl. Augustinus (Freiburg, 1882). For special studies see Lösche, De Augustino plotinizante in doctrina de Deo disserenda (a dissertation of 68 pages; Jena, 1880); Ferraz, La Psychol. de Saint-Augustin (Paris, 1863); Prantl, Gesch. d. Logik, &c., i. 665–72 (Leipzig, 1855; treats the logic of Augustine); and Merten, Ueber die Bedeutung d. Erkenntnisslehre des hl. Augustinus, &c. (Treves, 1865; his theory of cognition); Siebeck, Gesch. d. Psychol., I, 2, 358–401 (Gotha, 1884); Reinkens, Geschichtsphilos. d. hl. Augustinus (Schaffhausen, 1866).

(*c*) Nemesius (who wrote 400–50) devoted himself chiefly to a work entitled *De Natura Hominis*. It is a treatise on psychology, asserting free will and immortality, and represents an attempt to combine Plato and Aristotle. (*d*) In the works attributed to Dionysius the Areopagite (*De Divinis Nominibus*, *De Hierarchia caelesti*, *De Hierarchia ecclesiastica*,

not written earlier than 451), the introduction of the Neo-Platonic element into Christian thought was sealed. Distinguishing between affirmative theology which descends from God to the world, and abstractive theology which ascends from the world to God, the author develops the idea of the utter transcendence of the Deity. These writings show traces of Iamblichus and Proclus, and exercised great influence, especially with the mystics, in the middle ages. They were commented by Maximus Confessor in the 7th, and made known to the West by Scotus Erigena in the 9th century.

Literature (to 6 *c*): HIPLER, Dionysius d. Areopagit (Regensburg, 1861); LAFORÊT, Denys l'Aréopagite, Rev. Cathol. (1871), 364–97; COLET, Two Treatises on the Hierarchies of Dionysius, with trans., introd., and notes by J. H. Lupton (London, 1869).

(7) The endeavour to effect a conciliatory synthesis of faith and reason, which characterizes Christian thought in this earlier patristic stage, takes on the successive forms: (*a*) of logical classification of material (430–1050); (*b*) of reflex criticism (1050–1200); and (*c*) of organic completion (1200–1453), in the later stage of development brought about by the Schoolmen. See SCHOLASTICISM. (E.T.S.)

Patristics [Lat. *pater*, father]: Ger. *Patristik*; Fr. *patristique*; Ital. *dottrina patristica*. The critical and systematic study of the doctrines and writings of the fathers of the Christian Church.

Patristics covers the early period of Christianity from the Apostolic Fathers down to the time of the schism between the eastern and western branches of the Church when the construction and movement in theology came to a temporary close. The works of the fathers have been collected and edited by Migne, and more critically studied by Harnack and his associates. Cf. PATRISTIC PHILOSOPHY.

Literature: MIGNE, Patrology; HARNACK, Lehrb. d. Dogmengeschichte (2nd ed., 1888–90); SMITH and WACE, Dict. of Christ. Biog. (1880–6); DONALDSON, Crit. Hist. of Christ. Lit. and Doctrine (1864–6). See full lists under the various sections of the topic PATRISTIC PHILOSOPHY. (A.T.O.)

Patritius, Franciscus (Patrizzi, Francesco). (1529–93.) Educated in Venice and in Padua, where he attended lectures on Aristotle (1546). Travelled in Spain. Professor of Platonic philosophy in Ferrara, 1570–90. Opposed to Aristotle as a result of his study at Padua, and of his intercourse with Selesius and the Neo-Platonists. He wrote on poetics and theology as well as philosophy.

Patronymic [Gr. *πατρωνυμικός*]: Ger. *patronymisch*; Fr. *patronymique*; Ital. *patronimico*. A name derived from the name or description of the father or other male ancestor.

The correlative of METRONYMIC (q. v.), and having a parallel history. (F.H.G.)

Peace (in law) [Lat. *pax*, through Fr.]: Ger. *Friede*; Fr. *paix*; Ital. *pace*. (1) The condition of a state which is not at war, with respect to its foreign relations.

(2) The condition of a state relatively to another state with which it is not at war.

(3) The internal tranquillity which is the normal condition of a state with respect to its inhabitants.

Against the peace: that which violates this tranquillity. *In the peace*: the condition of one who is not violating it. *Sureties of the peace*: sureties exacted from those threatening to violate it, that they will *keep the peace*. *The King's peace*: the ancient expression by which English law denoted that immunity from acts of violence which was due to the sovereign, his household, court, and officers of government, and which was gradually extended to all within the realm, save outlaws. (S.E.B.)

Peccability and **Impeccability** [Lat. *peccabilis*, liable to sin]: Ger. *Sündhaftigkeit*; Fr. *peccabilité*; Ital. *peccabilità*. Terms used in theology to indicate not actual sinfulness or the opposite, but a state of liability or non-liability to sin. The commission of sin is not one of the contingencies of an impeccable nature.

The question has arisen (1) with reference to the human nature of Christ. All Christians agree as to his actual sinlessness; but some have held that while in his synthetic nature he is free from the liability to sin, yet that in his human nature he was liable to sin, although actually sinless. (2) With reference to the Virgin Mary, the doctrine of the Immaculate Conception involving her subsequent impeccability. This the majority of Protestants do not admit. (3) With respect to the saints. The majority of Christians deny the impeccability of any mortal this side of the grave. But the advocates of perfectionism hold a doctrine of relative impeccability.

Literature: see SIN, and PERFECTIONISM. (A.T.O.)

Pedagogical Psychology: Ger. *päda-*

gogische Psychologie; Fr. *psychologie pédagogique*; Ital. *psicologia pedagogica*. Psychology applied to the science and practice of education.

Literature: see under PEDAGOGICS. (J.M.B.)

Pedagogics [Gr. παιδαγωγία, the training or guiding of boys]: Ger. *Pädagogik*; Fr. *pédagogie*; Ital. *pedagogia*. The theory and art of teaching as a profession, involving the scientific application of the sciences of mind, body, and society, to the work of education.

Since pedagogics is an applied science, depending upon civilization for its ends, and upon psychology for its methods, it is natural, first, that different nations and different stages of civilization should vary in their ideals of the purposes of education; and second, that psychologists should vary in their method of approach to the study of educational problems according to their several ways of studying the mind. The main problems in pedagogics pertain (*a*) to the construction of the curriculum; (*b*) to the methods of teaching; (*c*) to the development of character.

There are three chief standpoints from which these problems are viewed: (1) The *a priori* method, which, following the lead of rational psychology, considers the necessary constitutive elements of the mind, the character and the institutions of civilization (see Rosenkranz, *Philos. of Educ.*); (2) the *a posteriori* method, which, ignoring largely the *a priori* aspects of mind and society, gives its main attention to the content of the studies and the processes of the mind (see Herbart, *Sci. of Educ.*); (3) the method of child study, or actual observation of children. It is evident that a complete pedagogics must take all these varying methods of approach into consideration, since each emphasizes important aspects of the ends and methods of education.

Literature: ROSENKRANZ, Philos. of Educ.; HERBART, Sci. of Educ. (Eng. trans.); PARKER, Talks on Pedagogics; HARRIS, Psychol. Foundations of Educ.; FROEBEL, Educ. of Man; BAIN, Educ. as a Science; REIN, Outlines of Pedagogics; A. ANGIULLI, La Pedagogia (1882); R. ARDIGÒ, La Scienza dell' Educazione (1893). (C.DE G.)

Pedagogy: see PEDAGOGICS.

Peduncle [Lat. *pedunculus*, a stalk]: Ger. *Schenkel*; Fr. *pédoncule*; Ital. *peduncolo*. In brain anatomy: a stalk-like fibrous body serving to connect a massive organ, such as the cerebrum or cerebellum, with the rest of the brain. Cf. BRAIN (Glossary). (H.H.)

Pelagianism: Ger. *Pelagianismus*; Fr. *pélagianisme*; Ital. *pelagianismo*. The doctrine of Pelagius. A system of theological anthropology which in the maintenance of its central doctrine of man's free and responsible agency is led to deny the original sinfulness of man's nature and the transmission of the effects of Adam's transgression, and to assert the opposite doctrines of man's natural sinlessness and his ability, without divine interposition, to take the initiative in his own salvation, thus limiting the function of the Holy Spirit to that of assistance to the human will.

Pelagianism arose historically as a reaction against AUGUSTINIANISM (q.v.), which asserts the inability of the human will and the necessary initiative of the Holy Spirit in man's regeneration and salvation. As a religious doctrine Pelagianism is less profound than the doctrine it opposes, inasmuch as the divine agency is necessarily the point of supreme emphasis in religion. Augustinianism represents a deeper insight, and is more profoundly religious than the opposing system. From the ethical point of view, as distinguished from the religious, Pelagianism seems to derive most of its strength. It is a system of ethical individualism, and its persistence in the form of semi-Pelagianism seems to indicate that it embodies an insight that needs to be conserved. Perhaps the one-sided assertion of Augustinianism would lead to a too extreme self-abdication on the part of the human spirit. On the other hand, the radical weakness of Pelagianism as a religious doctrine lies in its virtual denial of the prime necessity of divine grace and the limitation of the Spirit of God to a subordinate function in the regeneration of man. See PATRISTIC PHILOSOPHY.

Literature: ST. AUGUSTINE, Anti-Pelagian Writings (Eng. trans., N. Y., 1847); F. WIGGINS, Versuch einer pragmatischen Darstellung des Augustinianismus u. Pelagianismus (1831–3; Eng. trans., 1840); Encyc. Brit. and Johnson's Encyc., art. Pelagianism; SHEDD, Hist. of Christ. Doctrine (1863); F. WÜRTER, Der Pelagianismus (1866). (A.T.O.)

Pelagius. (cir. 370.) Not heard of after 418. Probably a Briton. He went to Rome about 400, and sought to check the degenerate tendencies of the city. He was simply a layman. Moved to North Africa about 409. He was later known to be in Palestine. The principal works of Pelagius were by mistake attributed to Jerome. See PELAGIANISM.

Penal: see CRIMINAL (in law), PENOLOGY, and REWARD AND PUNISHMENT.

Penal Code: see CODE.

Penance [Lat. *paenitentia*, repentance]: Ger. *Busse*; Fr. *pénitence*; Ital. *penitenza*. In Roman Catholic theology, the atonement which one who has committed post-baptismal sin makes for it by repentance, amendment, and the performances of expiatory works; or the Sacrament in which pardon, on the fulfilment of the requisite conditions, is formally granted.

Penance is a central feature of the practice of the Romish Church. The theory on which it rests is ordinarily rejected by Protestants as savouring too much of Pelagianism. The Sacrament of Penance is closely associated with the practice of auricular confession which arose in connection with it.

Literature: BINGHAM, Christ. Antiq. (Oxford, 1855); HAGENBACH, Hist. of Doctrines; CRAMP, Textbook of Popery; PROBST, Sakramente u. Sakramentalien (1872). (A.T.O.)

Pendulum: see LABORATORY AND APPARATUS, III, B, (*b*).

Penitence [Lat. *paenitentia*, repentance]: Ger. *Reue*; Fr. *pénitence*; Ital. *penitenza*. In general usage employed as a synonym for repentance, but more strictly, either as the equivalent of penance or as a name for the state of mind produced by the act of repentance. (A.T.O.)

Penology [Lat. *poena*; Gr. ποινή, penalty, + λόγος, discourse]: Ger. *Strafenlehre*; Fr. *théorie des peines*; Ital. *teoria della pena, penologia*. 'The study of punishment for crime, both in its deterrent and in its reformatory aspect; (including) the study of the management of prisons' (*Cent. Dict.*).

The term and the study it describes are of recent origin. The definition quoted is made exact by inserting the word 'including.' Penology has obtained vogue chiefly through the Howard Association of England and the National Prison Association of the United States. The literature of CRIMINOLOGY (q.v.) includes many works on penology, and courses on the subject are given in many universities. Cf. REWARD AND PUNISHMENT, and SANCTION. (F.H.G.)

Pentateuch [Gr. πεντάτευχος, from πέντε, five, + τεῦχος, book]: Ger. *Pentateuch*; Fr. *Pentateuque*; Ital. *Pentateuco*. The first five books of the Old Testament, containing the Mosaic account of the creation and fall of man, the origin and captivity of the Hebrew race, their flight out of Egypt, the giving of the law, and the establishment of the Theocratic Commonwealth at Sinai.

The Pentateuch is accepted by Jews and Christians as an inspired record, and the Mosaic law especially constitutes the authoritative basis of JUDAISM (q.v.).

Literature: for modern critical discussions of the Pentateuch and the questions involved see WELLHAUSEN, Hist. of Israel (Eng. trans., Edinb., 1885); KUENEN, The Religion of Israel (Eng. trans.); W. R. SMITH, Old Testament in the Jewish Church; W. H. GREEN, Moses and the Prophets. (A.T.O.)

Per accidens [Lat., translates κατὰ συμβεβηκός, meaning usually what is not necessary or not *per se*, that is, belonging to some other category than substance]. Boethius first applied the term to a conversion, in opposition to *ad se ipsam*, apparently by carelessness, as if this were *per se ipsam*. He means that the form of the proposition, namely, its quantity, has to be changed in the conversion, whether from universal to particular, or the reverse.

But logicians generally confine conversion *per accidens* to the conversion of the universal affirmative into the particular affirmative; as 'Any chimera is a living thing': hence, 'Some living thing is a chimera.' Some logicians follow an earlier phrase, and say that the universal affirmative is converted *particulariter* after Aristotle's ἐν μέρει. (C.S.P.)

Per se: see PERSEITY AND PER SE.

Perception [Lat. *perceptio*, from *percipere*, to perceive]: Ger. *Wahrnehmung* (*Anschauung*, see TERMINOLOGY, German); Fr. *perception*; Ital. *percezione*. (1) Cognition so far as it involves the presence of actual sensation as distinguished from mental imagery.

(2) Cognition of subjective process as such; the apprehension of the actual presence of this process in distinction from the ideal representation of it.

The first case is that of 'sense perception'; the second that of 'inner perception' or introspection. The second usage is not recommended.

The restricted application of the word as defined in the first sense is comparatively modern, and only gradually obtained recognition. The older writers use perception as a synonym for cognition in general. Wolff defines 'Mens percipere dicitur, quando sibi obiectum aliquod repraesentat' (*Psychologia*, § 24). Even now the wider usage occurs occasionally in writers on psychology. Perception, according to Locke, is 'by some called thinking in general' (*Essay*, Bk. II. chap. ix.

§ 1), and he himself regards thinking as a special case of it—the case in which perception involves voluntary attention. Hume's usage is similar. The first English writer who made a serious attempt to give a precise and circumscribed meaning to the word perception is Reid. His views, so far as they are psychological and not epistemological, agree in substance with those of modern psychologists. On the one hand he distinguishes perception from sensation, and on the other from ideal revival. The word sensation connotes only subjective state produced by an external stimulus without implying any awareness of an object. To have a sensation is merely to have a certain kind of feeling due to an impression on the organs of sense. Pure sensation would be purely affective consciousness (see AFFECTION). To have a perception is to be aware of an object by means of a present sensation. Perception is sensation only in so far as sensation conveys a meaning. 'I perceive a tree that grows before my window; there is here an object which is perceived, and an act of the mind by which it is perceived. . . . The object is made up of a trunk, branches, and leaves; but the act of the mind by which it is perceived hath neither trunk, branches, nor leaves. I find nothing that resembles it so much as the remembrance of the tree, or the imagination of it' (Reid, *Works*, Hamilton's ed., i. 183). Modern psychologists in general follow Reid in distinguishing between perception and sensation on the one hand, and perception and ideal revival on the other; but many of them refuse to make these distinctions so sharp and clear-cut as Reid makes them. There is a tendency to regard the distinction between sensation and perception as one of degree, and to treat ideal revival as merely a perception reinstated in a fainter form. A tendency to regard the distinction between sensation and perception as one of degree may take two forms; on the one hand, it may be denied that pure sensation as mere subjective state without cognitive function ever actually exists: this position may be held while the distinction between sensation and perception is in principle sharply recognized. On the other hand, it may be held that the difference between sensation and perception is merely one of complexity. On this view, what is called perception is actual sensation modified and supplemented by the revived residua of past sensations. Thus the distinction between sensation and perception has in principle disappeared; it is regarded as merely a matter of degree. The second position is well represented by James and Titchener; but there is this important difference between them, that whereas James reduces sensation to perception, Titchener reduces perception to sensation.

'It is impossible to draw any sharp line of distinction between the barer and the richer consciousness, because the moment we get beyond the first crude sensation all our consciousness is a matter of suggestion, and the various suggestions shade gradually into each other, being one and all products of the same psychological machinery of association. In the directer consciousness fewer, in the remoter more, associative processes are brought into play' (James, *Princ. of Psychol.*, ii. 76). In general, those who regard the distinction between sensation and perception as one of degree of complexity, also tend to minimise the difference between perception and ideal revival. At the present day this position is best represented in the school of Wundt, of which we may take Titchener as a typical representative. 'Perceptions and ideas are, both alike, groups of sensations; and, both alike, groups of sensations which are held together by the command of nature. They differ solely in this respect: that, when we perceive, the object which arouses the sensations is actually before us, appealing to various sense-organs; whereas, when we have an idea, the object is not before us, but the sensations are set up inside the brain without any disturbance of the organs on the surface of the body' (*Primer of Psychol.*, 95). In his *Outlines of Psychology*, Titchener applies the word idea both to perception itself and to the mental reproduction of it. The whole theory is based on the assumption that there are certain ultimate elements called sensations, and that the whole fabric of cognitive consciousness is built up by compounding these in more or less complex forms. This is a view which the writers are unable to accept. Ideational consciousness does not seem to be merely a more faint and imperfect reinstatement of perceptual consciousness. If, on the one hand, it contains less than perceptual consciousness, on the other hand it contains more. Cf. Stout, *Analytic Psychol.*, ii. 31 ff. (G.F.S.–J.M.B.)

In German the word Perception is not clearly distinguished from Wahrnehmung (cf. TERMINOLOGY, German, sub verbis). Wundt defines Perception as 'Wahrnehmung which

is not accompanied by a state of attention' (*Outlines of Psychol.*, 209, Eng. trans. by Judd, who renders the German Perception by apprehension). Cf. Eisler, *Wörterb. d. philos. Begriffe*, 'Perception.'

For philosophical theories of perception see EPISTEMOLOGY.

According to the early Greek thinkers perception was made possible by 'effluvia' (*ἀπορροαί*, Empedocles; cf. Aristotle, *De Gen. et Corr.*, i. 8, 324 b 26) or 'eidola' (*εἴδωλα*, Democritus, Epicurus), which acted in each case as medium or tertium quid between the object and the perceiver. Such media were small particles given off from the surface or pores of a body and conveyed through the air to the senses. The theory of perception was based upon the principle 'like only perceives like'—'similia similibus percipiuntur'—and hence the necessity of a tertium quid to mediate between the soul and its unlike object. Cf. Eisler, *Wörterb. d. philos. Begriffe*, 'Wahrnehmung,' 'Ausflüsse,' and 'Eidola.' (J.M.B.)

Literature: REID, Works (Hamilton's ed.), i. 182–8; HAMILTON, Lects. on Metaphysics, 21–5; VOLKMANN, Lehrb. d. Psychol., ii. 136 ff.; BAIN, Senses and Intellect (4th ed.), 384 ff.; SPENCER, Princ. of Psychol., ii. chap. x; WUNDT, Grundzüge d. physiol. Psychol., 4th ed., i. 289, ii. 1 ff. (Wundt applies Vorstellung both to perception and ideal revival, meaning by it complex grouping of sensations); WARD, Encyc. Brit., art. Psychology, 51 ff.; arts. on 'Assimilation and Association,' in Mind, N.S., July, 1893, and Oct., 1894; UPHUES, Ueber die Wahrnehmungsvorstellung; JAMES, Princ. of Psychol., chap. xix; STOUT, Manual of Psychol., Bk. III. chap. i; TITCHENER, Outlines of Psychol., Pt. II. chap. vii; Primer of Psychol., chap. vi; LADD, Psychol., Descrip. and Explan., chap. xv; SCHNEIDER, Der thierische Wille, 97; CROOM ROBERTSON, Elements of Psychol., 91 ff., 132 ff., 171; HÖFLER, Psychologie, 212–4; BALDWIN, Senses and Intellect. See also EPISTEMOLOGY, and BIBLIOG. B, i, *d*. (G.F.S.–J.M.B.)

Perception Time: see REACTION TIME.

Percipient: see TELEPATHY, passim.

Perdition [Lat. *perditio*, from *perdere*, to lose]: Ger. *Verdammniss*; Fr. *perdition*; Ital. *perdizione*. In the Jewish and Christian schemes of religious belief, the future state of the wicked and finally impenitent; involving not only the total loss of blessedness, but also a permanent state of retributive suffering. See ESCHATOLOGY (also for literature). (A.T.O.)

Perfectibility [Lat. *perfectibilitas*]: Ger. *Perfektibilität*; Fr. *perfectibilité*; Ital. *perfettibilità*. The theory that human nature is capable of attaining perfection in its individual and social capacity, and that a process of evolution towards that goal is actually going on. More specifically, the doctrine that Christian perfection may be attained in this life.

Literature: see PERFECTIONISM. (A.T.O.)

Perfection [Lat. *perfectus*, complete]: (for foreign equivalents see the next topic but one). (1) Complete realization of an ideal after its kind.

(2) Complete conformity to the demands of law, purpose, or utility.

These senses are often confused, as in the discussion (e. g. Spencer's) of the GOOD (q. v.). (J.M.B.)

Perfection (in aesthetics). (1) Completeness, absence of deficiency, as 'A perfect tree is one that has all its parts entire.' The 'quantitative' perfection of Kant, Herbart, Zimmermann.

(2) Exact conformity to an objective standard or end.

(3) Conformity to subjective demands, or feeling; that which is exactly as desired, or which pleases in the highest degree.

(4) Absolute embodiment of every desirable quality; divineness.

(5) Any particular quality which adds to the value of an object, as 'Harmony is a perfection.'

Perfection as aesthetic principle was made central by Baumgarten (1750) and his disciple Meier in a sense approaching that of (3). See AESTHETIC. It was considered by Kant in sense (2), and rejected as incompatible with the freedom of beauty, 'since we do not know what a flower, e.g., is intended to be, and hence cannot call it perfect.' Zeising employed it in sense (4), and recently Köstlin has sought to make it central by defining beauty as perfection of form, in senses (1), (3), and (5). Cf. also IDEAL, FITNESS, and SATISFACTION.

Literature: BAUMGARTEN, Aesthetica, §§ 14 ff.; KANT, Crit. of Judgment, §§ 15–17; STEIN, Entstehung d. n. Aesth., 350 ff.; BRAITMEIER, Gesch. d. poet. Theorie u. Krit. (1888–9), 23 ff., 152 ff.; KÖSTLIN, Proleg. z. Aesth. (1889), 78–95. (J.H.T.)

Perfection (1) and (2) **Perfectionism** (ethics). Ger. (1) *Vollkommenheit*, (2) *Perfektionismus, Perfektibilitätslehre*; Fr. (1) *perfection*, (2) *perfectionnisme*; Ital. (1) *perfezione*,

(2) *perfezionismo* (suggested). (1) Complete realization of the moral ideal, together with complete fulfilment of moral law.

(2) Belief or theory that this realization is possible or actual. (J.S.–J.M.B.)

Perfection has been offered as the moral standard by the intuitionists, in opposition to the utilitarian or hedonistic interpretation of that standard. This theory of perfectionism may be traced to Aristotle's conception of perfect or unimpeded functioning as the true end of every being, and of the perfect functioning of the distinctively human or rational nature of man as man's distinctive end. It is also to be traced to the Cynic and Stoic estimate of virtue or excellence of character (*ἀρετή*) as the supreme human good. In modern ethics, Kant's doctrine of the absolute worth of man as a moral being, of his unique position as an end-in-himself, is also a doctrine of perfectionism. According to Kant, however, perfection is unattainable by man: the moral ideal is infinite, while man's attainments are always finite, and the surd of animal feeling can never be eliminated from human life. The idealistic ethics of self-realization, which is a kind of Neo-Aristotelianism, also sets before man the ideal of perfection, and, since it does not condemn feeling as intrinsically and permanently irrational, regards this ideal as attainable. The Scholastic ethics regards perfection as attainable by man only through the influence of divine grace, enduing him with the 'theologic' or Christian virtues of faith, love, and hope; while the 'counsels of perfection' inculcate the monastic virtues of poverty, celibacy, and obedience. (J.S.)

The requirement of objective right or fulfilment of law is one with that of the attainment of goodness, only in the ideal; but the ideal, i.e. the perfect, must realize both. The element of right or law is especially emphasized by religious philosophy, in which regeneration, or imparting of supernatural grace, supplements human nature, and so makes perfection possible. In religious philosophy, therefore, perfectionism is the doctrine of complete right which is complete goodness, rather than the reverse. (J.M.B.)

Perfectionism (doctrine of, in theology). The belief held by various bodies of Christians that a state of sinless perfection is attainable in this life; the term perfection being construed, however, in a relative sense, which excludes only mortal sins and failures, it being possible for the state to coexist with venial sins and faults of character.

The doctrine of perfectionism rests on a distinction between mortal and venial sins and failings. This distinction is repudiated by the Calvinistic and Lutheran communions, which recognize the absolute divine standard as the only measure of sin and holiness. The believers in perfectionism proceed on the assumption that there is a relative human standard which, if attained to, constitutes the measure of perfect human character. A besetting danger of such a view is the almost irresistible tendency to self-deception which arises from the application of finite standards in the ethical and religious sphere. (A.T.O.)

Perimeter and **Perimetry**: see LABORATORY AND APPARATUS, III, B, (*a*), (1), and INDIRECT VISION.

Periodicity [Gr. *περὶ*, around, + *ὁδός*, a way]: Ger. *Periodicität, periodisches (Irresein)*; Fr. *périodicité, (folie) périodique, (délire) circulaire*; Ital. *periodicità*. Periodicity in biology and in medicine indicates the recurrence of special events at definite intervals.

The prototypes are the rhythm of the seasons, of waking and sleeping, and the periodicity of the menstrual function. In psychiatry, a certain periodicity of depression and excitement, and of times of normal conditions varying with abnormal ones, has long been recognized, occasionally in connection with menstruation, or in connection with the seasons or on alternate days, &c. Such periodicity has been repeatedly brought into relation with the moon (see the peculiarly suggestive pamphlet of Köster, *Ueber die Gesetze des periodischen Irreseins*, 1877); but neither the menstrual periodicity nor the periodicity observed in mental diseases has as yet been satisfactorily accounted for.

Of late the term has been applied very broadly to conditions varying without any definite regularity, as the attacks of epilepsy and the various attacks of insanity in one lifetime. It is certain that 'irregular periodicity' is far more frequent than the regular types. It is equally certain that this lax usage may lead to a confusion of recurrence, paroxysmal course, and periodicity. Recurrence is the broad term, including periodicity; but a recurrence of typhoid fever is evidently an altogether different thing from a recurrence of paroxysms of epilepsy, or of periodic depression, or periodic mania, or manic-depressive insanity. The tendency is to speak of periodicity where practically no external cause accounts for the recurrence, and of recurrence where the organism itself would not have

undergone repeated attacks without sufficiently obvious external causes.

In the looser sense of the term periodic psychoses, it is by no means necessary that all the paroxysms should be of quite the same duration and type of symptom-complex. Many cases of periodic depression have a constant alternation between healthy and depressed periods; in others an occasional attack of manic excitement may enter into this cycle; and in yet other 'periodic cases' the manic excitements may be the only form of paroxysm, or one or all the attacks may be delirious, paranoic, or stuporous. Since these forms of periodic psychoses show certain common fundamental features, an individual attack is spoken of as an 'equivalent,' just as the various types of attacks of epilepsy are called 'equivalents' of the epileptic attack. In cases where various equivalents have occurred, there is as a rule no possibility of foreseeing which equivalent any exciting cause will call forth, nor how long an attack or an interval will last in any case. Even after a number of regular cycles, irregularities are apt to occur. The fact that there are no sharp lines between the uniform and truly periodic disorders and those less regular seems to fully justify Kraepelin's free use of the term periodicity for irregular recurrence. (A.M.)

Literature: a general discussion of periodicity is RADCLIFFE, Periodicity in Disease, in Quain's Dict. of Med.; a very complete description is in SCHÜLE, Klinische Psychiatrie, 3rd ed. (1886), 287–324. See also the pathological treatises of ARNDT and A. PILCZ. (A.M.–E.M.)

Peripatetics [Gr. *περί*, about, + *πατεῖν*, to walk]: Ger. *Peripatetiker*; Fr. *péripatéticiens*; Ital. *peripatetici*. A name given to the school of Aristotle, traditionally because his discussions were carried on while walking about in the Lyceum (*Diog. Laert.*, Bk. V). The modern explanation, however, is that its name is derived from a special path (*περίπατος*) in the Lyceum used for taking walks.

Theophrastus, Eudemus, Strato, Aristo, Diodorus of Tyre, Andronicus of Rhodes, are among the chief successive heads of the school. The term New Peripatetics is sometimes applied to the writers of the Renaissance, who, in opposition to the Arabian and Christian Aristotelianism of the middle ages, attempted, by returning to the original Greek text, to give an objective setting forth of his doctrine. Pomponatius (d. 1625) and Scaliger (1558) are some of the greater names, most of which, however, belong to the history of scholarship rather than to that of philosophy. (J.D.)

Peripheral: see CENTRAL.

Peristaltic Contraction [Gr. *περί*, around, + *στάλσις*, constriction]: Ger. *Darmbewegung, wurmförmige Bewegung*; Fr. *mouvement péristaltique*; Ital. *moti peristaltici*. Rhythmic wave of constriction which passes normally downward along the alimentary canal, beginning with the act of swallowing in the pharynx and passing successively over the oesophagus, stomach, and intestine. (C.F.H.)

Permanence [Lat. *per*, through, + *manere*, to remain, persist]: Ger. *Permanenz, Beständigkeit*; Fr. *permanence*; Ital. *permanenza*. The condition of fixity, persistence, continuity, especially in time; existing unchanged through a given duration of time.

Beginning with Heraclitus and the Eleatic school, Greek philosophy was much occupied with the problem of rest and MOTION (q.v.), or of self-identity and change, the former being regarded as a sign of Being, and the latter of NON-BEING (q.v.). See also SAME AND OTHER. It was Kant who introduced the category of permanence in the modern sense. It is the critical and phenomenal counterpart of the old dogmatic, ontological conception of substance, and indicates that *quantity* of matter and energy remains unchanged, being neither increased nor diminished, in all changes of phenomena. It is thus the metaphysical counterpart of the scientific doctrine of the conservation of energy—metaphysical because derived not from observation or experience, but treated as a principle which is necessary to the having of experience (Kant, *Critique of Pure Reason*, 160–6, Müller's trans., and Preface to *Metaphysical Foundations of Nat. Sci.*). Cf. BELIEF for the consideration of permanence in the external world. (J.D.)

Perpetual Motion [Lat. *perpetuum mobile*]: Ger. *beständige Bewegung*; Fr. *mouvement perpétuel*; Ital. *moto perpetuo*. A contrivance, arrangement, or combination of natural agencies which will result in the doing of work without the expenditure of a corresponding amount of energy. Long believed impossible, and now known to be so, because in conflict with the law of CONSERVATION OF ENERGY (q.v.).

The term arises from the conception of a machine which should go on for ever without the application of any force from without. Numerous contrivances for this object have been proposed, but, of course, all were unsuccessful in practice. (S.N.)

Persecution (illusions of, mania of) [Lat. *persecutio*, a following after, pursuit]: Ger. *Verfolgungsvorstellungen, Verfolgungswahnsinn*; Fr. *manie de la persécution, idées délirantes de persécution*; Ital. *delirio* (or *idee morbose*) *di persecuzione*. In the realm of morbid DELUSIONS (q.v.) a most frequent and persistent form is that which ascribes the patient's abnormal sensations, pains, distress, and mental troubles to the mischievous plotting and persecutions of some one or more persons or agencies.

This so often constitutes the salient mark of the mental malady, that it has received this special name, and in typical cases it is characterized by definite symptoms and stages of development. The condition often begins with hallucinations of hearing, by which are brought to the patient all manner of threats and secret messages. At first these may be resisted, but later they come to dominate the entire life and thoughts of the patient. He is suspicious of every approach, discovers hidden allusions in all that is said or done; believes that a certain person or persons are plotting his destruction, are tormenting him with denunciations or maledictions, and so on. His energies are devoted to devising ingenious ways to avoid and thwart his persecutors. Cf. MONOMANIA. (J.J.)

Perseity (1) and (2) **Per se** [Lat. *perseitas, per se*, through itself]: Ger. *Perseität*; Fr. *perséité*; Ital. *perseità*. (1) Literally, the conception of self-included existence, but in its technical use the term applied to the Thomistic doctrine of the relation of good to the divine will. Cf. ST. THOMAS (philosophy of).

The Scotists held that good was the arbitrary creation of the divine will, in itself superior to it; the Thomists held that will in its adequate expression is essentially moved by the concept of the good as presented in reason, and that this relationship of reason and will holds in the divine nature as well as in the human. The *perseitas boni* is the essential rationality of the good. See Windelband, *Hist. of Mod. Philos.*, Eng. trans., 332. (J.D.)

Scotus says there are two kinds of 'perseity,' that of a demonstration and that of a predicate which belongs immediately to its subject.

(2) *Per se* translates *καθ' αὑτό, καθ' αὑτόν*, &c. Similar phrases occur in ordinary Greek. Plato, for example, in the *Theaetetus*, speaks of *ἐπιστήμη ἐν ἐκείνῳ τῷ ὀνόματι, ὅ τι ποτ' ἔχει ἡ ψυχή, ὅταν αὐτὴ καθ' αὑτὴν πραγματεύηται περὶ τὰ ὄντα*. But in Aristotle it first becomes a term of art (see Bonitz under *ἑαυτοῦ*). He enumerates four or five different meanings of it, from which we are led to infer that he did not himself invent it. Two such passages are *Met.*, Δ. xviii. 2, and *Anal. Post.*, iv. There are others, but they are less clear. *Per se* cannot very well be understood without some understanding of the phrase *secundum quid* (*καθό*). Aristotle says:—

'*Secundum quid* is said in several senses. In one sense it is the species (*εἶδος*) and essence of anything; thus, that *secundum quid* a man is good is itself good. Another sense is in what anything first comes into existence, as colour in a surface. In the first sense the *secundum quid* is the form (*εἶδος*); in the second it is the matter and first subject of anything. And, generally speaking, *secundum quid* refers to a cause. "*Secundum quid* comes a man" is "on what account comes he?"; and "*secundum quid* does he paralogize," or "does he syllogize," is "what is the cause of the paralogism" or "the syllogism?" Furthermore, *secundum quid* is said in reference to position in space; as "*secundum quid* stands he," or "*secundum quid* is he walking." In such phrases it denotes position and place.

'Consequently, *per se* is necessarily said in different senses. In one sense, *per se* refers to the essence (*τὸ τί ἦν εἶναι*) of anything; as, "Callias is *per se* Callias," that is, the very essence of Callias. It also refers to whatever is involved in the definition of anything (*ὅσα ἐν τῷ τί ἐστιν ὑπάρχει*), as "Callias is *per se* an animal"; that is, that he is an animal is implied in the word, or animal is what Callias is. The phrase is further applied in case anything in its origin assumes any character in itself or in what belongs to it (*εἰ ἐν αὐτῷ δέδεκται πρώτῳ ἢ τῶν αὐτοῦ τινί*); thus white is *per se* a surface, and man is *per se* alive, since the soul, which is part of man, receives life in its very origin. Further, that is *per se* which has nothing else as its cause. Thus there are many causes of man, such as being an animal, being biped, &c.; yet still man is *per se* man. Further, whatever belongs to one thing alone, and in so far as it is alone, is *per se*; so that what is abstract (*κεχωρισμένον*) is *per se*.'

These five senses are, then, (1) that a substance exists *per se* and not *per accidens*; (2) that an analytical proposition is true *per se*, or formally, and not as matter of fact; (3) that any character which a thing necessarily assumes by virtue of existing, belongs to it *per se*, and not *secundum quid*; (4) that which a thing

causes of itself it does *per se*, and not *per aliud*; and (5) that which any abstraction, *quâ* that which it is, is, does, or suffers, is *per se* and not *secundum quid*.

The second of the above senses is called *per se primo modo*; the third is called *per se secundo modo*; but a different explanation from the above is often given. In reliance particularly on a passage in Aristotle's *Met.*, Z. v, it is said that a predication is *per se secundo modo* where the definition of the predicate contains the subject.

Another important expression is 'known *per se*.' A proposition is known *per se* if, and only if, it is cognoscible from its own terms but not cognoscible in any other way. For instance, that the letters on this page are black is not known *per se*, because it may be proved by testimony. Nor, on the other hand, is the doctrine of the Trinity *per se*, though it cannot be proved; for it is not self-evident. It has to be received on faith. But there was a great controversy between the Thomists on the one hand and the Scotists with the Nominalists on the other, as to whether, in the above definition, the word 'terms' was to be taken *objective* or *formaliter*. See the Conimbricenses in I. *Anal. Post.*, iii. (C.S.P.)

Perseverance (of the Saints) [Lat. *per* + *severus*, strict]: Ger. *Beharrlichkeit*; Fr. *persévérance*; Ital. *perseveranza*. A doctrine of the Calvinistic creeds, thus stated in the Westminster Confession: 'They whom God hath accepted in the beloved, effectually called and sanctified by his Spirit, can neither totally nor finally fall away from the state of grace, but shall certainly persevere therein to the end and be eternally saved.'

The doctrine of perseverance is founded partly on predestination and the decrees and partly on the nature of regeneration as the birth of a new spiritual nature. It is argued that the decree cannot be thwarted and that the work of regeneration is too radical to be undone. The doctrine is rejected by Arminians, who condition continuance in the new life on the free choice of the will. Man may be truly converted, they argue, and then fall away and become finally reprobate. Calvinists admit the possibility of temporary lapses, but contend that it is never final where conversion has been real and genuine. See CALVINISM.

Literature: HOOKER, The Certainty and Perpetuity of Faith in the Elect; CALVIN, Institutes; works of JOHN WESLEY and CHARLES HODGE. (A.T.O.)

Persia (religion in ancient): see ORIENTAL PHILOSOPHY (Persia).

Persistence (in physics): see CONSERVATION OF ENERGY.

Persistence (of the external world): see BELIEF, and cf. PERMANENCE, and INERTIA.

Person and **Personality** [Lat. *persona*]: Ger. *Person, Persönlichkeit, Personalität*; Fr. *personne, personnalité*; Ital. *persona, personalità*. An individual—and individuality—considered as having the higher reflective, intellectual and moral, attributes of man.

The idea of personality, in its ethical significance, has been influential in modern ethics, especially of the idealistic and intuitional types. Its origin is partly Christian, partly Roman. The latter conception of personality was essentially legal; and it is in this sense that Hegel uses the term to express the most abstract and external view of morality, the person being the subject of rights. The Christian idea of the absolute moral worth of personality is central in the ethics of Kant, for whom man as a rational being is an end-in-himself and a law unto himself. It is also the standpoint of the Neo-Hegelian ethics of self-realization. For the Scottish school the moral life is essentially personal. (J.S.–J.M.B.)

The term is an objective one, correlative with the psychological or subjective meanings given to PERSONAL IDENTITY and REFLECTION (see those terms). That is, 'consciousness of personal identity' is a way of expressing, from the subjective standpoint, the fact of objective personality; though the best usage would seem to restrict the subjective side of personality to the higher stages of personal consciousness which carry the social distinction between the 'self' and the 'not-self.' The term 'personal' is used both strictly as an adjective of person in the above sense (it is so recommended) and also to mean private to oneself.

Literature: see under SELF, PERSONAL IDENTITY, and INDIVIDUAL. (J.M.B.–G.F.S.)

Person (in law). A being of any sort having rights and duties under the law; the legal subject, of which rights and duties are attributes (Pollock, *Jurisprudence*, chap. v. 108).

Such a human being is a *natural person*. *Artificial, conventional, moral, juristic*, or *juristical persons* 'are such groups of human beings or masses of property as are in the eye of the law capable of rights and liabilities' (Holland, *Jurisprudence*, chap. viii. 84; Markby, *Elements of Law*, § 138). The person entitled

to a right is styled by Holland (chap. viii. 79) the *person of inherence*; and the person bound to the corresponding duty, the *person of incidence*. A sovereign state is a person, and it may create artificial persons at will. Its treasury may be made one.

A slave, in ancient law, was not recognized as a person. The Roman law recognized artificial persons, created by authority of the state (*Dig.*, xlviii. 22, *De Collegiis et Corporibus*). It is a legal maxim that 'Quando duo iura concurrunt in una persona, aequum est etsi essent in diversis' (Acton's Case, 4 Coke's Reports, 118). Another is that 'Unus homo plures personas habere potest.' (S.E.B.)

Person of Christ. The concrete individuality of Jesus Christ embracing the human and divine natures in one unitary consciousness and experience. See JESUS.

The great question with reference to the Person of Christ has been that of the relation of the human and divine in his nature. All the possible alternatives have found advocates, viz. that the human dominates; that the consciousness of Christ is dominantly divine; that there is a duality of consciousness; that the two elements are maintained in one consciousness.

Literature: see SYNERGISM. (A.T.O.)

Personal: Ger. *persönlich*; Fr. *personnel*; Ital. *personale*. Having the attributes of a PERSON (q. v.).

Contrasted (1) with the impersonal, that to which the concept personal does not apply; also (2) with subpersonal, and (3) with superpersonal — terms which set respectively a lower and a higher limit to the concept of personality.

All of the lower forms of organization which are yet personal in type (e. g. animals, which are said to have an undeveloped form of self-consciousness) are called subpersonal; God or the Absolute, with whose infinity the ascription of the finite attributes of personality is said to conflict, is called super- (or hyper-) personal. Cf. LIMITING NOTION. The duplicate or multiple quasi-personalities sometimes developed in the same organism are described as subpersonalities: they 'tend to assume personal form' (James). The conception of the superpersonal finds recent statement in Bradley's *Appearance and Reality*. (J.M.B.)

Personal Equation: Ger. *persönliche Gleichung*; Fr. *équation personnelle*; Ital. *equazione personale*. An error made by a person in a measurement or exact observation of any kind, which is peculiar to himself, and which must therefore be determined and allowed for when the precise result of the observation or measurement is to be derived.

The most common example is in time estimates or observations. It is found that when different persons determine with the utmost precision the moment of an occurrence, as of the transit of a star's image across a thread in a telescope, or that of a nerve impulse or perception, different persons will, in the mean of a great many observations, differ in their estimates.

This term was first used in astronomy, the existence of an error in the observations of transits being detected about the close of the 18th century (1795) in a Greenwich observer named Kinnebrook, who was dismissed in consequence by Maskelyne. Its existence as a general feature of the work of all observers was recognized by Bessel and others early in the 19th century. (S.N.)

Bessel (1822) discussed the psychological causes of the personal equation. Originally the time of transit was recorded by watching the star and listening to the ticking of a clock (eye and ear method); about 1850 the method of recording the transit chronographically was introduced. The former of these methods may be regarded as the basis of psychological experiments on the time-phenomena of perception, while the latter led to reaction-time experiments. The personal equation should be carefully distinguished from the REACTION TIME (q. v.), which includes as well that portion of the ERROR OF OBSERVATION (q.v.) which different individuals have in common.

Literature: BESSEL, Abhandlungen, iii. 300; WUNDT, Physiol. Psychol. See the literature of REACTION TIME. (J.McK.C.–J.M.B.)

Personal Identity: Ger. *persönliche Identität*; Fr. *identité personnelle*; Ital. *identità personale* (or *dell' io*). (1) Psychological: the consciousness of IDENTITY (q. v.) attaching to the self.

(2) Equivalent to INDIVIDUALITY (q.v.), i. e. when used descriptively or objectively (which is not recommended; see PERSONALITY).

The psychological sense of personal identity has been much theorized about. It is often made a final and irreducible phase of personal consciousness; part of the definition of the self as conscious. The attempt, however, to analyse the content of self raises the question of the process whereby the apprehension of sameness comes to attach to this as to other

contents, and then the broad question of recognition in general arises with the requirement that the sense of personal sameness or identity be considered a case of this broader phenomenon. Whether this procedure shows that personal identity is a derived or genetic product, would seem to depend on the result of the analysis of recognition: that is, on whether recognition depends exclusively upon objective factors, or whether there is a subjective or 'self-recognition' aspect in all recognition. Even if the result be to show that there is an irreducible element of self-value in all recognition, the further question would still arise, as to whether this element is not, after all, a matter of the presentation of the object-self, and thus a matter of presentative construction —not, after all, an irreducible character of the subject-self. This question arises in regard to the continuous interest which, as is said below, has a leading part in the constituting of individual identity (cf. also what is said of the 'subjective or dispositional' aspect under RECOGNITION). All such expressions, therefore, as 'direct knowledge' of the sameness of self, immediate 'recognitive memory' of self, 'intuition' of self as being the same, &c., have no value in lieu of thorough analysis of the general fact and process of recognition.

(J.M.B.–G.F.S.)

Indicating a more positive view, we may apply what is said of the cognition of individual IDENTITY (q.v.), of which this is a special case. I am aware of myself as one being, because my self has for me unity of interest and exclusiveness of interest. But there exists a complication in the case of personal identity which does not exist in the case of other individuals. I only come to be, in the fullest sense, one person by being aware that I am one person. The consciousness of unity is itself an integral part of the unity of which I am conscious. The unity of self-consciousness is the crown and completion of the unity of consciousness. But the unity of consciousness as expressed in the word 'I' cannot wholly consist in recognition of this unity. Otherwise we should be involved in a circle. The unity must already exist in some manner and degree before it can be cognized. How then is this primary unity constituted? The answer is only to be found if we consider the essential correlation of knowing and willing consciousness with objects known and willed. Subjective process is identical with itself throughout its changing phases if and so far as it is throughout concerned with objects recognizably the same. The seeking consciousness is one with the finding consciousness, because what is found is identified with what was sought. My unity as one individual person is essentially correlated with the unity of my world as known and willed. And just as the world of knowledge and will possesses different degrees of unity for different individuals and different levels of mental development, so personal identity admits of very varying grades of completeness. It can scarcely be said to exist in lower animals: it is more imperfect in the child than in the adult, and in the savage than in the civilized mind.

The philosophical problem involved in personal identity or individuality, on the other hand, is that of the value and meaning of the category. On the psychophysical side, the theory is prevalent that personal identity represents in some way the more permanent organization in the brain which stands for conscious personality, together with the neurological process underlying recognition. As to the latter, the hypotheses which make it respectively a sensory and a motor phenomenon are cited under RECOGNITION.

The requirement of analysis is enforced by pathological alterations and less grave illusions. Cf. PERSONALITY (disorders of). The complexity of the problem is further illustrated from the opinion of some that in the early and more unreflective stages of personal self-sense the bodily person is included in the content taken for self.

Literature: LOCKE, Essay on the Human Understanding, Bk. II. chap. xxvii; HUME, Treatise on Human Nature, Pt. IV. § 3; references given under SELF, notably to HERBART, LOTZE, BRADLEY, and under RECOGNITION.

(G.F.S.–J.M.B.)

Personality: see PERSON.

Personality (disorders of): Ger. *Persönlichkeitsstörungen*; Fr. *altérations* (or *troubles*) *de la personnalité*; Ital. (*malattie della*) *personalità*. Disorders of personality involve more or less disorganization of the memory continuum, and of the group of elements which enter into the normal consciousness of personal identity.

(J.J.–J.M.B.)

The analysis of the physiological and psychological basis of personality naturally conditions the exposition of its disorders. A survey of typical cases of altered personality is in itself valuable, and contributes to a clearer understanding of its normal basis. Minor alterations appear in connection with many nervous and mental disorders involving changes

in the general sensibility (conaesthesia) and in the emotional disposition; the patient feels himself changed and different; his sensations seem unnatural or impersonal; he seems to act automatically and without proper feeling of motives. When hallucinations are combined with this, he may be led to believe that 'some one "makes" his thoughts for him. Another has two bodies lying in different beds. Some patients feel as if they had lost parts of their bodies—teeth, brain, stomach, &c. In some, part is made of wood, glass, butter, &c. In some, part does not exist any longer, or is dead, or is a foreign object quite separate from the speaker's self' (James). So also in the excited conditions of general paralysis, the MEGALOMANIA (q. v.) expresses a modified personality. The patient feels buoyant, possessed of endless strength, or knowledge, or authority, or riches, and, with disordered logical powers, poses this new personality as Hercules, pope, emperor, or God. Alterations of personality become most striking when they alternate in the same individual. Such cases are to be found in the records of hysteria, epilepsy, and obscure functional nervous diseases; and in other cases their relation to the organic feelings and to the emotional changes is marked. A young woman early abandoned to a life of shame, and later placed in a convent, would pass, as the result of nervous disorders, through two periods, believing herself to be alternately prostitute and nun; and in each her tone, manner, dress, and speech were radically different and appropriate. Another patient alternated between lieutenant and monk, seemingly anticipating the return of the other personality, and preparing for it by shaving his beard, changing his dress and his habits. An hystero-epileptic boy, brought up in beggary and theft, was later trained in useful occupations, and particularly tailoring; but in a return of his earlier personality remembered nothing of his later life, could not sew, and was again the untaught vagabond. From orderly behaviour and polite manners he returned to boorishness with his early stealing propensities.

Still more remarkable are the cases cited by Mac Nish (*Philosophy of Sleep*, 1830); the noted case of Felida, given by Azam, 1858; the case of F., published by Mesnet, 1874; the cases of Lucie (Janet) and Louis V (Bourru and Burot); the case of B., published by Guinon, 1891 (for this see Binet, as cited below); the case of Mary Reynolds and Ansel Bourne (see James, as cited below). These cases do not admit of synoptic statement, but involve progressive and systematized developments of personalities, irregularly alternating with the normal personality. In one case the abnormal personality gradually usurps the place of the normal; in another the two remain independent and distinct, each series of memories being formed independently of the other; in yet another the memories of one state include the former experiences of previous similar conditions as well as of the normal state, but in the normal state no recollection of the doings of the abnormal state remains. In some cases three or more states are developed. The transition from one state to the other may involve a deep sleep, or only a momentary unconsciousness; its coming may be foreshadowed, or it may appear and disappear suddenly and unexpectedly; the second personality may inherit the automatism and education of the first, or may leave the individual like 'an infant, just born,' yet born in a state of maturity, and with everything to learn anew, and so on.

These more extreme and striking alternations of personality, while constituting an important group of such disorders, are not best suited for an analysis of their origin and nature. This has been attempted by a study of artificially induced personalities in hypnotized subjects; especially in cases of patients exhibiting some form of hysterical anaesthesia. It has been shown that such anaesthesia is not complete, but dissolves under appeal to the subconscious or disaggregative personality which controls it. The anaesthetic member ordinarily feels nothing, but under the influence of suggestion or in a condition of distraction gives unmistakable evidence of its sensibility. The negative hallucinations or systematized anaesthesias of hypnosis fall into the same class, as do also the condition of distraction favourable to AUTOMATIC WRITING (q. v.) and certain forms of trance. Under this view the disorders of personality first described become cases of spontaneous somnambulism, in which a subconscious or disorganized personality comes to the surface, just as it does by suggestion in cases of hysterical anaesthesia. Automatism and suggestibility are common features of both states. Moreover, it has been demonstrated that the forgotten states in spontaneous cases of alternating personality can be recalled during the hypnotic condition. The theories of personality based upon conceptions of this type cannot be regarded as comprehensively satis-

factory; but they furnish a suggestive basis of explanation, and one which embraces in an orderly scheme various forms of alterations of personality.

Under all theories the connection of changes of personality with organic disturbances, particularly in the field of anaesthesias and paraesthesias, is of fundamental importance. In some cases such connection is clear, an anaesthesia appearing in one state and disappearing in another; in other cases it can only be indefinitely inferred. Its influence in alienations of personality has already been noted. But such paraesthesias frequently affect the dominant emotional tone or temperament, and this, whether gay or sad, contemplative and brooding or suspicious, or curious and vivacious and interested, influences the quality and character of the personality. Finally, the influence of distinct hallucinations and the fluctuations and vagaries of a disordered intelligence may develop changes or alienations which are at the mercy of individual fancy, and cannot be expected to conform to the results of logical analysis. The changes of personality incident to spontaneous trance and to the induced trance-states of spiritualistic and other mediums should be cited in this connection, but cannot as yet be described under the light of explanatory principles.

Literature: Ribot, Diseases of Personality (1885; Eng. trans., 1891); Binet, Alterations of Personality (1891; Eng. trans., 1896); Azam, Hypnot., double conscience et altérations de la personnalité (1887); Bourru and Burot, Variations de la personnalité (1888); P. Janet, Automatisme psychol. (1889); James, Princ. of Psychol., i. 383; Myers, Proc. Soc. Psych. Res. (1890), 233; Héricourt, Activité inconsciente de l'esprit, Rev. Scient., Aug. 31, 1889; La personnalité et l'écriture, Rev. Philos., April, 1886; Morselli, Semej. malat. ment.; Dessoir, Das Doppel-Ich (1890), Psychol. Rev., i; Forbes Winslow, Obscure Diseases of Brain and Mind, chaps. xiii–xvii; Royce, Anomalies of Self-consciousness, in Stud. in Good and Evil; Dugas, Un cas de dépersonnalisation, Rev. Philos., 45; Dépersonnalisation et fausse mémoire, Rev. Philos., 46; B. Leroy, Sur l'illusion dite dépersonnalisation, Rev. Philos., 46. See also references under Automatic Writing. (J.J.)

Personification: Ger. *Personification*; Fr. *personnification*; Ital. *personificazione*. A general term for the attribution to natural objects of some or all of the characteristics of personality.

The notion of personification is mainly current in mythology and comparative religion and philology. It is more exactly rendered by the narrower conceptions of Animism (q.v.) in its various forms in philosophy, and Ejection (q.v.) in psychology. It is distinct from Anthropomorphism (q.v.), since it is a further step from personification to identify the personified forces and objects of nature with the anthropomorphized gods. The questions formerly 'treated' under the term personification may now be distinguished somewhat as follows: (1) Does primitive man first of all and naturally look upon nature as in any sense personal, i.e. like himself? (2) If so, in what sense?—physical, forceful, social, mental?—as merely moving, as opposing, as arranging, as planning? These two questions relate to an ultimate personifying category. (3) How does he think of himself, and how does he come by this thought?—is it a reflex of his experience of nature?—the question of Introjection (q.v.)—or does he reach both self and the 'spirits' of nature by special experiences, e.g. from dreams? Cf. Dream (anthropological). (4) Granted a start in the personifying direction, either natural or acquired, what is the process by which it becomes fuller, takes on its various stages, and finally disappears altogether?

The exact answers to these inquiries will be slow in coming; meanwhile the interpretation of Animism, Totemism, and Fetichism (see these terms) awaits such answers. The rise of grammatical gender is another cognate and unconsidered question; for gender is in some form a quasi-personal distinction.

The tendency is to accept some sort of a psychological process by which thoughts of self and nature arise in the human mind together, and exist in close correlation. The violent divorce between them is a matter of high development, and the depersonification of nature, in the categories of mechanical science, becomes the real problem, rather than the personification of nature.

Literature: see the citations under the topics referred to, especially under Introjection, and Ejection. A brief psychological note may be found in Höffding, Outlines of Psychol., 2 ff.; consult also the literature of Race Psychology, and most of the general works given under Anthropology. (J.M.B.)

Personification (in aesthetics): see Symbol.

Perspicuity [Lat. *perspicuus*, clear, from *per* + *spicere*, to look]: Ger. *Perspicuität*,

terms cited below; Fr. *perspicuité*; Ital. *perspicuità*. Perspicuity is said to be an adjunct of truth variously defined. A perspicuous concept is defined by Burgersdicius as one which represents its objects clearly, distinctly, and fully (*Inst. of Met.*, I. xix. 2). Kant, in the *Logik* by Jäsche (Introd., viii), after remarking that aesthetic distinctness (Deutlichkeit) often causes objective, or logical, obscurity, and vice versa (as if he had been reading Mill's *Logic* or *Liberty*!), defines perspicuity (Helligkeit) as the union of objective and subjective distinctness. Hamilton (*Lects. on Logic*, xxiv) defines a perspicuous definition as one 'couched in terms intelligible, and not figurative, but proper and compendious.' (C.S.P.)

Pertinent [Lat. *pertinere*, to reach to, pertain, be pertinent]: Ger. *zur Sache gehörig*; Fr. *pertinent*; Ital. *convenevole*. In the doctrine of *obligationes*, in logic, pertinent is applied to a proposition whose truth or falsity would necessarily follow from the truth of the proposition to which it was said to be pertinent, and also of a term either necessarily true or necessarily false of another term to which it was said to be pertinent (cf. the *Cent. Dict.*). (C.S.P.)

Perturbation [Lat. *perturbatio*, confusion]: Ger. *Verwirrtheit*; Fr. *perturbation, trouble*; Ital. *perturbazione*. Mental perturbation is a condition of disquiet or hesitancy; a restlessness or absence of mental tranquillity. As such it is a normal mental experience, but in extreme degrees, or when of protracted duration, it is characteristic of abnormal conditions. (J.J.)

Perversion [Lat. *perversio*, a turning about]: Ger. *Perversion*; Fr. *perversion*; Ital. *pervertimento, perversione* (ethical). A degeneration or morbid alteration of the instincts, feelings, habits, or modes of thought.

These occur in many forms of insanity and in individuals of morbid, neurotic heredity. Perversions of taste, perversions of the sense of pain, a perverted moral sense have been noted in hysteria, in mania, in idiocy, &c. (Cf. these terms, and also especially Moral Insanity, and Degeneration.) Sexual perversions have been extensively studied, and are in most cases regarded as symptomatic of nervous or mental disorder; a special case is inversion or homosexuality—sexual instinct directed towards persons of the same sex.

Literature: Havelock Ellis, Studies in the Psychol. of Sex, i; Sexual Inversion (1897); Krafft-Ebing, Psychopathia Sexualis; Moll, Conträre Sexualempfindung (1891). (J.J.)

Pessimism: see Optimism and Pessimism, and cf. Meliorism.

Pestalozzi, Johann Heinrich. (1746–1827.) Educated in theology and law, his health failed and he devoted himself for some time to farming. Established a school for poor peasant children (1775); failed (1780). Devoted himself to literature for eighteen years. Took charge of an orphan asylum in Stanz (1798–99). Assisted in opening a school in Burgdorf Castle (1799). Elected member of deputation sent by the Swiss to Paris (1802). In 1804 he removed his school to Münchenbuchsee. He removed to the Yverdun Institute the same year. Retired to Neuhof, his earlier farm (1825). He is called the founder of modern pedagogy.

Petitio Principii [Lat. This is a not very good translation of Aristotle's phrase *τὸ ἐξ ἀρχῆς* (or *ἐν ἀρχῇ*) *αἰτεῖσθαι*, to beg what was proposed in the beginning]. It is a Fallacy (q.v.) of a relatively high order, inasmuch as it cannot exist unless the conclusion truly follows from the premises. To accuse a man of begging the question is in reality a plea which virtually admits that his reasoning is good. Its only fault is that it assumes as a premise what no intelligent man who doubted the conclusion could know to be true.

A very necessary, though not always sufficient, precaution against this fallacy is to ask oneself whether the reasoning rests upon any observations, or inductions from observations, or even trustworthy hypothetic inferences from observations, which really involve the conclusion, relating to those matters of experience in reference to which the conclusion is important; and if relating to those things, whether in such a way and so closely that that conclusion really can have been implicitly asserted in those premises. For example, to take an illustration partly fanciful, a man proposes to prove the reality or possibility of clairvoyance to me by proving to me that the sum of the angles of a triangle is two right angles. If, he says, you can sit in your study and know that this is true in the most distant parts of the universe, why may not an exceptionally gifted person know many facts about what happens only a hundred miles away? Upon that, I ask myself whether geometry rests upon any observations concerning clairvoyance or anything like clairvoyance. Nay, the consequence which my arguer has pointed out seems so cogent, and

yet the line of reasoning so inadmissible, that I go up to the garret to exhume my old Euclid or Legendre, to see how it is proved that sitting in my study I can know what the angles of the triangle whose vertices are at Sirius, Arcturus, and Fomalhaut, may sum up to. I find it is done by assuming that certain propositions about space are self-evident. Now, this may be safe enough so far as that sort of reasoning has been millions of times verified. But nothing of the sort has been, or can be, verified exactly; and for such monstrous triangles a divergence from exactitude in the formula may be large, although for terrestrial triangles it be too minute for detection. In short, I am led to see that there must be a *petitio principii* in any argument which, resting merely on common sense, concludes the exact truth of any matter of fact. (C.S.P., C.L.F.)

Petrus Hispanus (Peter of Spain). (1226–77.) A scholastic logician who became Pope John XXI.

Phacoscope: see LABORATORY AND APPARATUS, III, B, (1).

Phantasm [Gr. *φάντασμα*, an appearance]: Ger. *Phantasma*; Fr. (2) *fantôme*; Ital. (2) *fantasma*. (1) Used formerly (as equivalent to the Greek *φάντασμα*) to mean mental pictures or revived images of all sorts. (J.M.B.)

(2) Applied to hallucinations of forms or spectres, whether occurring under normal or quasi-abnormal conditions; apparitions.

The appearances provoked by a dose of opium or hashish, the phenomena of dream-life, the forms conjured up by the excited imagination of religious devotees, the spasmodic or habitual externalizations of the visualizing faculty, may all be spoken of as phantasms. In the literature of the Society for PSYCHICAL RESEARCH (q. v.) the term has received a more specialized meaning, and 'phantasms of the living' is applied to the apparition to a friend or relative of persons still living but approaching death, and as if premonitory of such death. The term phantasmagoria was applied to the raising or recalling of the spirits of the dead, as formerly practised, or as imitated by natural agencies; or again to any series of illusory figures, as those occurring in dreams or hallucinations. (J.J.)

Phariseeism [Gr. *Φαρισαῖος*, Pharisee; Heb. *parush*, separated]: Ger. *Pharisäertum*; Fr. *pharisaïsme*; Ital. *fariseismo*. Self-righteousness in religious profession combined with over-scrupulousness in the observance of forms. Historically, the principles of the Jewish sect of Pharisees, who in religion united orthodoxy with belief in the authority of oral traditions, and in politics were opposed to foreign dominance and ideas.

The Pharisees first appeared as a party of that name in the reign of John Hyrcanus, 135–105 B. C. From the beginning they represented national exclusiveness and opposition to foreign and especially Greek influences. They were orthodox believers, in opposition to the free-thinking Sadducees. They were the educated class and the intellectual and moral leaders of their time, and, in spite of their shortcomings, stood distinctively for the best elements in Judaism.

Literature: WELLHAUSEN, Die Pharisaei und d. Sadusaei (1874); Encyc. Brit., arts. Israel and Messiah. (A.T.O.)

Phase [Gr. *φάσις*, from *φάειν*, to make to appear, to make visible]: Ger. *Phase*; Fr. *phase*; Ital. *fase*. One of a series of definite forms, or modes of appearance, or specific characters which one and the same subject-matter presents either successively, or from different points of view.

It is often used as synonymous with aspect, but strictly speaking is differentiated by referring to successive, instead of simultaneous, modes of manifestation. It also involves a shade less reference to the subject or percipient, 'aspect' indicating a certain distinction introduced by the way the subject looks at the matter. (J.D.)

Phenomenalism [Gr. *φαίνεσθαι*, to appear]: Ger. *Phänomenalismus*; Fr. *phénoménisme*; Ital. *fenomenismo*. (1) The theory that all knowledge is limited to phenomena (things and events in time and space), and that we cannot penetrate to reality in itself. Cf. PHENOMENON, EMPIRICISM, AGNOSTICISM, and POSITIVISM.

(2) The theory that all we know is a phenomenon, that is, reality present to consciousness, either directly or reflectively; and that phenomena are all that there are to know, there being no thing-in-itself or object out of relation to consciousness.

This latter is the philosophy held by Shadworth Hodgson. Cf. also IMMANENCE PHILOSOPHY (q.v.). It is obvious that the two senses differ radically from each other, the first having its point in the assertion of a real but unknown thing-in-itself; the latter in its denial. (J.D.)

Phenomenology [Gr. *φαινόμενον*, that which appears, + *λόγος*, doctrine, theory]: Ger. *Phänomenologie*; Fr. *phénoménologie*; Ital.

fenomenologia. (1) Literally, the theory of appearances or manifestations; in technical use, that theory of the particular, especially historical, facts of any subject-matter which exhibits them as natural and necessary manifestations of their underlying principle. Cf. PHENOMENON.

Hegel thus used the term in his *Phenomenology of Spirit*, to express the progress of mind, individual and racial, from the lowest form of knowledge, through successive necessary stages, to the highest—absolute thought. On the obverse side, it is thus also an exposition of the extent of reason in its generalized or typical temporal stages of development. Among recent writers v. Hartmann is given to using the term to denote the exposition of a general principle with reference to a philosophic construction of historic data.

(2) Kant used the term in a different sense to denote one of the four branches of his *Metaphysic of Nature*; viz. that concerned with motion and rest as regards their modality, that is, their use as predicates of a judgment about things. (J.D.)

Phenomenon [Gr. *τὸ φαινόμενον*, a thing that is seen, that appears]: Ger. *Phänomen, Erscheinung*; Fr. *phénomène*; Ital. *fenomeno*. (1) In Greek thought phenomena were always opposed to essences (*ὄντα*), and hence defined as possessing a lesser and derived form of reality. No particular gulf exists between the two; both are objective, but the phenomena are changeable and manifold, and related to sense, while essences are eternal and one, and related to reason.

(2) But in modern times the phenomenon is opposed to the THING-IN-ITSELF (q. v.) or to the NOUMENON (q. v.). They belong to radically distinct orders; the phenomenon is always relative to us, dependent upon the way the thing-in-itself affects us in sensation, or the way the mind looks at it. This is especially true in Kantian thought. The word appearance (Schein) is often used somewhat in this sense—for that which has the SEMBLANCE (q. v.) at least of reality.

(3) It is also used in what we may term a naturalistic or positivistic sense: it is the object or event in space or time, and as such capable of accurate observation and description; reflection based upon it is verifiable.

This third sense is also derived from Kant, but is used without any reference to the subjective factor—to the part played passively by our sensibility and actively by our understanding in the constitution of the phenomenon. The reconciliation of this third sense, which makes phenomena the data of positive science and thus objective, and the second, which defines them through reference to impressions made upon our senses (which of course would be different if our senses were different), constitutes the chief problem of the concept of 'phenomena.' To meet the difficulty, Kant employed his distinction of matter and form; but since, according to modern science, 'matter' of objects throughout, down to its last sensuous detail, is subject to quantitative laws—since, indeed, it is just this 'matter' which is the real object of science—the distinction of phenomena as related to us, in distinction from objects in themselves, seems practically to fall through.

(4) It is used in a colourless philosophic sense, as equivalent to 'fact,' or event—to any particular which requires explanation. And it may be questioned whether this practical, apparently non-philosophic sense is not in truth the most philosophic of all. (J.D.)

For quotations illustrating special usages see Eisler, *Wörterb. d. philos. Begriffe*, 'Erscheinung.' (J.M.B.)

Philanthropy [Gr. *φίλος*, lover, + *ἄνθρωπος*, man]: Ger. *Philanthropie*; Fr. *philanthropie*; Ital. *filantropia*. Disinterested love of our fellow men and action prompted by it.

Such is the altruistic conduct prescribed by Christianity. The Stoic cosmopolitanism, especially in its later Roman form, incited to a love of humanity in general, but fell short of a positive and practical philanthropy through its contempt for the body and the things of the world, as well as through its absolute optimism. It was the genius of Christianity to substitute the new motive of the 'enthusiasm of humanity' for the pagan motive of citizenship. Yet the Greeks possessed the idea and used the term.

Literature: SCHMIDT, Eth. d. alten Griechen, i. 308, ii. 277; LECKY, Hist. of European Morals, chap. iv. Cf. BENEVOLENCE. (J.S.)

Philo Judaeus, or **Philo.** (cir. 20 B.C.–cir. 50 A.D.) Spent his entire life in Alexandria, excepting a journey to Jerusalem and one to Rome. Of a wealthy and prominent family, he was sent on an embassy of the Jews to Caius Caligula at Rome about 40 A.D. Philo's defence of the Jews was later read in the Roman Senate. He interpreted the sacred books of the Jews. See ALEXANDRIAN SCHOOL.

Philolaus. Lived about the 4th century B.C.; a Pythagorean philosopher.

Philology [Gr. *φίλος*, lover, + *λόγος*, discourse]: Ger. *Philologie*; Fr. *philologie*;

Ital. *filologia*. The science 'which deals with human speech, and with all that speech discloses as to the nature and history of man' (Whitney, *Encyc. Brit.*, 9th ed., art. 'Philology'). Cf. LANGUAGE.

Philology is a department of study which seeks to restore a vital sympathy with a past form of civilized life, chiefly through the medium of its language. The relics or monuments of such a life surviving in the form of language, whether as literature, inscriptions, glosses, or other record, constitute, in connection with the language itself as an embodiment of the folk-spirit and an index of the national consciousness, the central objects of attention and the chief materials of the science; but other monuments, such as the material remains dealt with primarily by archaeology, and other data and other points of view—the historical, the geographical, the meteorological, the artistic, the philosophical—are utilized as secondary and interpretative through the co-operation of other sciences or disciplines.

The term philology has often been used, and is still to some extent, particularly in France, in the narrower sense of the scientific study of language, but this use is both historically and practically unjustifiable, except perhaps on the score of brevity. The science of language, whether viewed as a department of philology or as an independent though auxiliary discipline, pursues the study of speech phenomena as a possible end unto itself; philology regards the study as a means to an end. To philology language is the finest mould of a national life and the plastic material of literature.

As scientific or historical grammar usually employs to a greater or less extent the comparative method, it is very commonly called comparative philology, though the term comparative science of language (vergleichende Sprachwissenschaft) is more exact.

Literature: see LANGUAGE, and cf. LANGUAGE FUNCTION. (B.I.W.)

Philosopheme [Gr. *φιλοσόφημα*]: Ger. *Philosophem*; Fr. *philosophème*; Ital. *filosofema*. A demonstrative reasoning supposed to prove a truth from self-evident premises.

It is necessarily, at best, a PETITIO PRINCIPII (q. v.); but it is the Aristotelian ideal of perfect reasoning (see Aristotle, *Top.* viii. 162 a 15, 279 a 30, 294 a 19). (C.S.P.)

Philosopher-king: Ger. *Philosoph auf dem Throne, Herrscher-Philosoph* (Schwegler); Fr. *roi-philosophe*; Ital. *re-filosofo*. A supreme ruler who is a philosopher, or a philosopher who is a supreme ruler.

Plato declares (*Republic*, v. 474) that until philosophers are kings, or kings philosophers, neither the human race nor the body politic will ever be free from ills. The typical instance in ancient times was Marcus Aurelius; in modern times Joseph II of Austria. In our own days philosophers have not been highly prized as politicians; the separation between men of theory and men of practice has become sharp. This does not necessarily imply an aversion on the part of the practical men to take counsel of the philosophers. (J.B.)

Philosophical Encyclopedia: see ENCYCLOPEDIA (philosophical), and PHILOSOPHY.

Philosophy [Gr. *φίλος*, lover, + *σοφία*, wisdom]: Ger. *Philosophie*; Fr. *philosophie*; Ital. *filosofia*. Four general senses may easily be distinguished: (1) The widest sense, in which it means the explanation of any set of phenomena by reference to its determining principles, whether practical, causal, or logical; theory, reasoned doctrine.

In this sense, it is in common use in English speech. Natural philosophy is physics; and we hear of the philosophy of invention, of machines, of digestion, of hair-dressing, and so on indefinitely.

(2) Used in the same wide sense, but with a clear ethical implication: the power and habit of referring all events and special facts to some general principle, and of behaving (of reacting to the events and facts) in the light of this reference; the working theory of things as exhibited in conduct. Thus we say: he took it philosophically; he is a real philosopher; his philosophy deserted him. In this second sense, there is often an implication of Stoicism in its popular meaning; that is, the reference to general principles enables one to endure or suffer calmly what would otherwise excite emotional disturbance.

(3) The technical and most restricted sense: an account of the fundamentally real, so far as from its consideration laws and truths may be derived, applying to all facts and phenomena: practically equivalent to METAPHYSICS (q. v.).

(4) A theory of truth, reality, or experience, taken as an organized whole, and so giving rise to general principles which unite the various branches or parts of experience into a coherent unity. As such, it is not so much any one discipline or science, as it is the system and animating spirit of all.

Thus Kant, with apparent tautology but real discrimination, speaks of philosophy as the sum of the philosophic disciplines.

In all these various senses, certain common implications appear: (*a*) Totality: philosophy is conceived as a comprehensive view, as dealing (objectively) with the whole or universe, and accordingly as (subjectively) requiring to be pursued in a catholic, impartial spirit. It is thus marked off from what we term the special sciences, which limit their view to some one specific set of facts. Even when, as in (1) above, it is used in reference to a very limited sphere, it yet implies a certain totality within that sphere. (*b*) Generality: just because the view is of a whole, it manifests itself in universals, in principles; it deals with explanations, not with a mere summary, inventory, description, or narration. (*c*) Application: the general truths do not remain inert or sterile, but are carried over to illuminate and make reasonable the relevant details. While this application may primarily be to fact simply as observed or known, it yet extends, ultimately and derivatively, to conduct. The term implies the difference between wisdom and information or learning. The world, or particular subject, getting a certain organization, the acts and habits that have to do with it inevitably assume a corresponding arrangement. While some deprecate this ethical connotation as an intrusion into what should be a purely objective attitude of science, it is too deeply embedded to be exorcized. Hence the narrow meaning (3) has never become fixed, nor made its way into everyday usage. As A. Seth remarks (art. 'Philosophy,' *Encyc. Brit.*, xviii. 806): 'It will not be easy to infuse into so abstract and bloodless a term as "metaphysics" the fuller life (and especially the inclusion of ethical considerations) suggested by the more concrete term philosophy.'

Gathering these various elements together, philosophy may be defined as the theory of a subject-matter, taken as a whole or organized unity; containing principles which bind together a variety of particular truths and facts, and requiring a certain harmony of theory and practice. Since all subordinate and derived subjects are, by the nature of the case, only wholes by courtesy or in a relative sense, the conception forces us back to *the* unity, Experience—to the universe or whatever is taken as a systematic whole.

If any one complain that we have not here, after all, a clear-cut, well-limited definition of philosophy, the reply is that a certain vagueness, born of the very generality of the idea, is embodied in the conception itself; and that to eliminate this, by holding the term down to just this or that meaning, is to show oneself not so much a philosopher as an adherent of some philosophic sect. In other words, philosophy expresses a certain attitude, purpose, and temper of conjoined intellect and will rather than a discipline whose exact boundaries and contents can be neatly marked off.

The same indefiniteness of outline shows itself when we attempt to divide philosophy into its component parts, or subsciences. Various writers have regarded as desirable a regularly recognized subdivision which should be observed by various schools; but this wish, up to the present, is certainly not realized. The need for organization is felt in very different places at different times, and thus very diverse distributions of emphasis arise; e.g. with the early Greeks it was the world of nature which needed to be presented as a totality, hence the tendency of cosmology to be the supreme science; in mediaeval times, it was upon religious experiences that the stress of need fell, and so theology was dominant; with the rise of modern science, it is the methods of discovering truth that need organization, hence the dominance of epistemology, and so on. Now according as one discipline or another is regarded as central, various schemes of arranging the others are set forth.

Moreover, instead of having a formal subdivision, into which materials fall, as matter of fact it is the interpretation of the material which controls the forms. One example will serve: What is the place of aesthetics as a philosophic discipline? Cannot those who differ in principles yet agree upon assigning a certain uniform position to this discipline, to which shall be referred all relevant material? No. The history of thought reveals that, at one period, sense, feeling, and imagination are all regarded as imperfect or confused thought, and hence aesthetics appears as a contributory, and probably minor, part of a dominant intellectual science; at another period the manifestation of truth in the realm of sensuous feeling is one of the co-ordinate spheres of the exhibition of the absolute, the other spheres being its appearance in the realm of intellect (logic), and in that of will (ethics). Or again, a certain equilibrium of sense and intellect is regarded as the highest ideal;

this balance is supposed to be found in beauty, and aesthetics is virtually, at least (as in some aspects of Schelling's thought), the supreme and normative discipline; or ethics is made subordinate to aesthetics, as with Herbert. The various placings of psychology would indicate even more radical divergencies.

It is because the classification and arrangement of philosophic problems is really dependent upon the value and meaning attached to the material concepts of philosophy, that the history of philosophy is now regarded as the best introduction to philosophic study; and the so-called introductions have mainly a pedagogic value, as introducing students in an orderly way to the problems which have arisen historically. Accordingly, further account of these subdivisions is reserved for the historical sketch below.

A schematic classification of problems in philosophy may, however, be made by classifying the various historic philosophies in accordance with the questions that have preoccupied them, and the points upon which they have insisted in their solutions. Thus philosophic schools are classified: (1) According to the number of fundamental principles recognized, as MONISM, DUALISM, PLURALISM. (2) According to the sort of value attached to the fundamental principle chosen as basis of organization, as MATERIALISM, SPIRITUALISM, and PHENOMENALISM. (3) According to the organ or instrument of knowledge most emphasized, as RATIONALISM and SENSATIONALISM; or as INTUITIONALISM, INTELLECTUALISM, EMPIRICISM, and MYSTICISM. (4) According to the method pursued: (*a*) as regards its examination of its own procedure, philosophy is subdivided into DOGMATISM, SCEPTICISM, and CRITICISM; (*b*) as regards the relation of method to results reached, into AGNOSTICISM and GNOSTICISM, or into TRANSCENDENTALISM, POSITIVISM, SOLIPSISM, and NIHILISM. (5) According to the relationship assumed between subject and object in knowing, as REALISM (with its various subdivisions, naïve, natural, transcendental, hypothetic, reasoned, transfigured, &c.) and IDEALISM (subjective, objective, or absolute).

But since, of course, all actual systems are determined by complex cross-references, any such scheme is extremely formal, save as we keep in mind the influence which, say, the theory of the organ of knowledge has upon the theory of the relationship of subject and object, and upon the conception of the nature or quality of the object. Thus idealism tends to become identified with spiritualism, and often with rationalism or intuitionalism. Dogmatic materialism is replaced by a (relatively) critical MECHANISM, which substitutes the causally connected system of facts and events for the substance, Matter, and so tends towards Positivism or even Phenomenalism. Spiritualism may be dualistic, or even pluralistic as well as monistic; it may run into HYLOZOISM, which is quasi-materialistic, or into PANPSYCHISM; or it may mean just IMMATERIALISM, the denial of the substantial reality of matter, which in turn is identical, from certain points of view, with subjective idealism. If in Monism the theological problem sets the dominant interest, we get PANTHEISM (or even, under certain historic conditions, as with Xenophanes, MONOTHEISM); if the question of relation of mind and body, PARALLELISM; if the problem of reconciling subject and object in such a way as to account for the possibility of knowledge, absolute IDEALISM. It is these interrelations which one informed by the history of philosophy keeps in mind, and thereby avoids a rigid use of any of the terms; while the immature mind ignores them and thus indulges in wholesale proof or refutation of an -ism, refuting, say, Monism as a pantheistic or religious system, but ignoring its bearing as a theory of relation of subject and object in knowledge, and so on. See the topics cited in small capitals.

The traditional ascription of the origin of the term to Pythagoras (as by Cicero and the ancients generally) is probably unfounded. Plato clearly uses the term, first to discriminate the (Socratic) love of truth from the (Sophistic) assertion of it. Man is neither wholly wise (*σοφός*) nor wholly ignorant (*ἀμαθής*), but stands between (*Phaedrus*, 278; *Symposium*, 212; *Lysis*, 218). In this general sense, science, or even any special science, as geometry, is philosophy; morality and art are also forms of it, since the love of beauty and that of virtuous character are stages in the ascent towards complete truth. But it finds its most perfect expression in the knowing which is directed towards true and essential being, as distinct from the (probable) knowledge or opinion which terminates with the sensible and the changing (*Rep.*, v. 477 and 480, vi. 484). Since this knowledge of essential being is dependent upon a particular method, philosophy in its most special sense is dialectic. (For the early

history of the use of the term, with bibliographical references, see Ueberweg, *Hist. of Philos.*, i. § 1. For Plato, see Erdmann, i. 102–4.) But just because the supremely real is the Good, and because true knowing is true virtue, philosophy gets also with Plato an intensely ethical sense; it is the guide to conduct. Thus, indeed, dialectic (the undivided source of logic and metaphysic), ontology, and ethic are all one in the Platonic system, while physics is immediately derivative, since the world of nature is determined by ends, and finally by the Good.

If we do not find formal subdivisions, it is precisely because the material context of the Platonic thought demands a synthetic identification, which to modern analytic tendencies easily seems to be mere confusion. The method of ascending from the world of appearance to the world of being, and the corresponding descent, is not a merely subjective nor even merely logical process; it is paralleled by the relations of subordination and participation which exist objectively in the ideas, among themselves, and in relation to the world of change. Hence there is a refusal to separate logic and ontology; not merely their confusion. If physics is more definitely marked off, it is just because the world of change with which the earlier physicists had exclusively occupied themselves (see NATURE) is distinguished from the world of being; yet since it depends upon it, and since again the essential being is also the Good, the physics of Plato must be, so to speak, just an applied ontology and ethics. Subsequent Greek thought hardly did more than make explicit the distinctions involved in Plato, but often carrying the discriminations necessary for this explicit formulation into separations—the exact character of which depended upon the material context of their own view of the world. Aristotle gives logic that ambiguous position which it retained so long. On one hand, it seems to be propaedeutic and instrumental only; a setting in order of the means by which we most surely attain reality, rather than, as with Plato, also an account of the truth itself; truth is agreement with being, rather than the being itself, and thus Aristotle dismisses dialectic as equivalent to empty and formal, almost verbal, thinking apart from subject-matter; treating it as Plato treated sophistic. But he cannot so far escape the Greek realistic absorption of subject and object into each other, as to regard thinking as merely subjective, and so in his ontology (called by him first philosophy, and by his followers metaphysic), or account of reality in its comprehensive and fundamental nature, the chief distinctions of thought reappear as distinctions of being: the difference of subject and predicate in judgment as distinction of substance, or essence, and quality and accident in being—so that from one point of view Aristotle's logic is still thoroughly objective (see Adamson, art. 'Logic' in *Encyc. Brit.*, xiv. 792–4). Leaving the exact position of logic unsettled, the other divisions are fairly clear, though not by any means so fixed as they are frequently represented. After his first philosophy or metaphysic comes physics, which treats respectively of the heavens; of meteorology, or the region between earth and heavens; of the history of animals; of biology (within which is included psychology): these (probably with mathematics in his original conception) make up theoretic philosophy. Practical philosophy has two subdivisions, ethics and poetics, corresponding to the distinction of doing and making, or of action and production (*πράττειν* and *ποιεῖν*, *actio* and *factio*), since in one the motive, disposition, and mental habit is the essential thing; in the other, the result, the 'work of art.' Ethics, in turn, deals both with the individual as such, although conditioned by organized social life—ethics in the narrower sense; and with the conditioning organization—politics. Here again an ambiguity similar to that found in the relation of logic to metaphysic affects subsequent thought; on the one hand, the state seems to be the presupposition and the completion of the individual moral life, and thus politics is the wider science; and again it appears as an adjunct or instrument, sometimes a more or less external one, of the individual life—the theoretic virtues, which belong to the individual, and transcend the state, being placed higher than the practical ones.

The distinctions of ontology or metaphysic, of theoretic and practical philosophy, and the subdivision of the former into logic and physics were easily drawn by the successors of Plato and Aristotle, and became its formal or conventional divisions. But, none the less, certain tendencies were at work which, underneath this formal arrangement, profoundly disturbed its equilibrium. Aristotle had expressly identified the supreme reality with God, and thus first philosophy is also theology. With the Neo-Platonists the implied religious factor comes to complete

recognition, and since God as Pure Being is above thought and knowledge (see NEO-PLATONISM), a certain mystic condition of ecstasy becomes the means and sign of unity with him, and philosophy, as theory of the means of attaining this mystic unity, tends to become THEOSOPHY (q. v.). On the other hand, much of the definite content of previous philosophy is formulated for the purposes of the schools, and so leads to a variety of special disciplines; particular branches of science (astronomy, mathematics, &c.) and of culture (grammar and rhetoric) are set off by themselves. This tendency reaches a culmination in Cassiodorus (469–508 A. D.) and Isidorus (560–636 A. D.), who distinguish, and put in encyclopedic form, the trivium, the three arts: grammar, dialectic, and rhetoric, summed up as logica; and the quadrivium, the four disciplines: arithmetic, economics, music, and astronomy—called collectively at first mathematics, and later physics. The writings of Isidorus, particularly, were the encyclopedia of the middle ages, and these classifications had great influence.

Another motive was the tendency, in which Stoics, Epicureans, and Sceptics all agreed, to make the practical of more importance than the theoretical, reversing Plato and Aristotle. With the Stoics, philosophy thus becomes the art of virtue; with the Epicureans, the art of living happily. Logic, in particular, takes a distinctly formal position; while physics, with the Epicureans at least, gets an almost negative value, being just the knowledge of nature which will enable one to avoid the burdens of superstition. A notable exception, however, is Lucretius, who, though animated by the same motive, yet develops the atomic theory in such a way as really to make physics the normative centre of philosophy.

All of these motives finally met and combined in the ethico-religious spirit of Christianity, resulting in the conception which identified theology and philosophy. Since theology was conceived at first wholly as a positive or revealed matter, this meant, for a time, the virtual abrogation of philosophy; but as soon as the need was felt of presenting even the purely positive and supernatural content of theology in a reasoned form, philosophy began to revive, although having no independent place. When the need was deeply felt of exhibiting the various church authorities in harmony with themselves and one another, and still more when the need was to show that there is no contradiction between faith and reason, philosophy became, though still in theological form, supreme. In the latter period, Aristotelianism was revived as furnishing the method and leading ideas of philosopic reason, and naturally his classification of philosophic sciences was more or less followed. There are, however, these differences: (1) Logic is clearly regarded as merely formal and propaedeutic; (2) ontology and metaphysic are identified with theology in a more thoroughgoing way than with Aristotle, and especially, of course, with the doctrines of the Church, particularly that of the Trinity; (3) the positive scientific content of physics is virtually lost, what remains being a philosophy of the creation of nature; (4) ethics is also, of course, submerged in religion, and becomes the theory of the Fall, or of sin and redemption. In view of later psychological developments, it is, moreover, interesting to note that, in spite of the disregard of psychology as a distinct discipline, when any ground for the classification is given, it is a psychological one. Thus with Gilbert of Poitiers (d. 1154) theology corresponds to *intellectus*, while physics is based upon *ratio*. Albertus exhibits the first systematic result of the revival of Aristotelianism, and the need of giving Christianity a reasonable statement over against the Aristotelianism of the Mohammedans, and against the heretics in the Church. Theoretical philosophy is (*a*) metaphysics, which is identified with theology, because (objectively) it deals with the divine, and because (subjectively) it is possible only through divine illumination, not through natural unaided reason; (*b*) mathematics; (*c*) physics. Psychologically, these correspond to the intelligible, the imaginable, and the sensible spheres. Practical philosophy is (*a*) monastics (that is, dealing with the individual in himself, the nearest approach to ancient ethics); (*b*) economics (the individual as member of a family); and (*c*) politics (the individual as a citizen). In spite of the nominal identification of theology and philosophy, Albert, however, makes little attempt to connect the peculiar content of Christian theology with metaphysic, and indeed often emphasizes the distinction between the theological and the philosophical (Aristotelian) view, since the former has a purely practical aim, salvation. Thomas Aquinas, the greatest of the schoolmen, makes the connection explicit. Salvation is the same as knowledge of the truth. The

same God, or Truth, is thus the object of both theology and philosophy.

Nominalism, while not explicitly denying or even interfering with the classic and current distinctions, was yet bringing new elements into philosophy which tended towards a reconstruction. Its theory of universals, &c., tended to submerge logic (such as was not merely verbal) in psychology, and its emphasis upon will tended also in the same direction; while its distinction between philosophy and theology (the doctrine of the twofold character of truth), limiting the latter to positive faith or dogma, even when conceived in a thoroughly pious way, yet tended to give philosophy greater freedom and a basis for adequate attention to empirical facts.

With the Renaissance, philosophy regains its independence, and new points of view arise. Three tendencies are especially important as affecting both the definition of philosophy and its subdivisions. (1) Nature becomes an object of free inquiry, involving observation, experiment, and reflection unhindered by either the principles of Aristotle or the dogmas of the Church. Hence (*a*) while logic is, with the scholastics, regarded as purely formal (and consequently condemned as of little or no account), a new logic grows up—an account of thought as an instrument or mode of reaching truth. The so-called empiricists, as Bacon and Hobbes, are as much devoted to problems of method as are the rationalists, Descartes and Spinoza. (*b*) The world of material objects is regarded by many as the object of the most certain and also the most useful knowledge. Bacon tends strongly in this direction—though making provision still for metaphysics and final causes—while Hobbes is explicit and militant in identifying philosophy with the science of 'bodies.' And, upon the continent, Descartes, Spinoza, and Leibnitz are all profoundly influenced by concepts resulting from the growth of science; and all feel profoundly the need of a philosophy which will take account of and explain the physical world, newly revealed. (2) Psychology gets a more and more important place. Ancient psychology was distributed through three other disciplines, hardly having any existence of its own. It was partly contained in metaphysical logic, as a theory of the various forms and stages of truth; partly contained (and this is true from Plato, Aristotle, the Stoics and Epicureans, through St. Augustine) in ethics, as an analysis of will, its relation to desire, intellect, &c.; and partly contained in physics, as Plato derives the individual soul from the world-soul, and Aristotle treats human psychology as the highest part of his biology or theory of life. But the religious tendency of Protestantism; the new political conditions magnifying the individual; the ethics that grew from these tendencies and from the decline of the influence of dogmatic theology; and finally the tendency of all parties to find in an examination of conscious processes the justification, as well as the origin, of method—all conspired to give psychology a central position. And if we are accustomed to associate this tendency more with the names of Locke, Berkeley, Hume, Reid, Hamilton, and Mill, yet it is certainly a characteristic feature of the thought of Descartes, Leibnitz, Kant, Hegel, and Herbart as well. (3) The development, in connection with both the newer logic (or method) and psychology, of interest in the problem of the nature and possibility and implications of valid knowledge (EPISTEMOLOGY, q.v., Erkenntnisstheorie). While Kant first makes this explicitly the basis of all philosophy, occupying the central position of metaphysics with Aristotle, and theology with the scholastics, yet the conception all but breaks through from the time of Hobbes and Descartes.

Two further tendencies remain to note. (i) In the 18th century, through the influence of the ENLIGHTENMENT (q.v.), philosophy came to be regarded as practical wisdom, as knowledge of the world, arranged in some system (though the system was generally but eclecticism) with reference to its bearing upon life (Weltweisheit). While it may be difficult to point out the specific influence of this conception upon technical philosophy, yet it has been absorbed into modern culture (making up, indeed, a large part of the content of the term culture) in thoroughgoing fashion. (ii) In the present century, historical method has had so profound an influence upon philosophic thought, that it is not yet possible to comprehend it, or to state its limits. The prevalence of the method is seen in the tendency to take a dynamic view—to consider objects not as given or fixed, but with reference to a process. In view of this, fixed distinctions and classifications in philosophy tend to be obliterated; we get rather moments, stages of development, &c., a tendency obvious in Hegel, when he ranks under philosophy of spirit ethics, philosophy of state and history, aesthetics, and the philosophy of religion, as

well as anthropology and psychology. For while the series is, of course, in no sense a historical one, it yet would be an incomprehensible jumble if presented in an age not saturated with the historical sense. It appears equally in Spencer when the successive portions of his system are presented as biology, psychology, and sociology. Hence the logic of history tends to replace a purely analytic logic, in setting forth the various spheres which fall within the scope of philosophy and their relations to one another: distinctions based upon positions occupied in a series of stages of development are substituted for those depending upon peculiar values presented in a static whole.

Many still make a radical distinction between questions of genesis, dealing with *how* things came to be, and questions of analysis, dealing with *what* they are, and refer the former, historical question to science, and the latter, analytic one to philosophy; yet it may be asked whether this distinction is not itself a survival of an age which had not the historical point of view; and whether genesis is anything but controlled, orderly, and complete analysis. Cf. ORIGIN *versus* NATURE.

At all events, it is the uncertainty as to the classification of psychology (whether as a special positive science, or a discipline in which logic, aesthetics, and ethics all have their roots), and uncertainty as to the exact value to be assigned to historical development—in its widest sense—that make the subdivisions of philosophy now offered by different writers so diverse, and that tend to reduce them (in default of any standard of certainty) to conveniencies of exposition. Cf., besides the topics mentioned, HISTORY OF PHILOSOPHY, EPISTEMOLOGY, METAPHYSICS, ORIENTAL PHILOSOPHY, and PATRISTIC PHILOSOPHY. (J.D.)

Literature: see the Histories of Philosophy and the Introductions to Philosophy, BIBLIOG., i, Bibliographical; also BIBLIOG. A, 1, and B, 1. UEBERWEG-HEINZE, Grundriss d. Gesch. d. Philos. (contains extensive literature lists). Annual bibliographies are issued by the Arch. f. Philos. and the Rev. Néo-Scol. (J.M.B.)

Philostratus. A name applied to four Greek sophists of the same family of Lemnos. See PRE-SOCRATIC PHILOSOPHY (Sophists).

-phobia [Gr. *φόβος*, fear]: Ger. *-phobie, -furcht* (in compounds); Fr. *-phobie*; Ital. *-fobia*. A suffix in general use to indicate excessive or morbid dread of an object, as AGORAPHOBIA (q.v.), fear of open places; photophobia, dread of light; neophobia, fear of anything new; mysophobia, fear of dirt or pollution; pyrophobia, fear of fire; symbolophobia, fear that every action has a symbolic or hidden import; phobophobia, a vague, nervous dread even of being afraid; and so on indefinitely. In such terms as hydrophobia (see RABIES) the meaning is somewhat modified. Such phobias are symptomatic of weakened conditions of the nervous system, and occur in cases of neurasthenia, hysteria, mania, monomania or paranoia, as well as in persons of quite normal mental health. Cf. Marrel, *Les Phobies* (1895). (J.J.)

Phobophobia: see -PHOBIA.

Phonetic Laws: Ger. *Lautgesetze*; Fr. *lois phonétiques*; Ital. *leggi fonetiche*. The laws governing the changes of sound in the historical development of a language.

It is a matter of observation that when a sound changes in one word of a language it changes, if like conditioned, in all. How this shall be accounted for has been matter for much controversy among philologists and psychologists. It cannot, as was at first believed by some, be due to like influence of climate and environment. It cannot furthermore, as contended by Paul, Brugmann, and others, be due to gradual and insensible changes in the individual sound which attack all alike; for observation shows that when changed a sound changes entirely, and often in one word at a time. But there can be no doubt that the change runs from word to word with great rapidity until the whole material of the language is affected. The link between a word containing a given vowel which has suffered change, and one containing the same vowel which has not, can only be the double sound image, the new and the old in the case of the former word. By analogy the new is extended to the second word.

Literature: PAUL, Principien der Sprachgeschichte (1898); BRUGMANN, Zum heutigen Stand d. Sprachwissenschaft (1885); WHITNEY, Indogerm. Forschungen, iv. 32 ff. (B.I.W.)

Phonetics [Gr. *φωνή*, sound]: Ger. *Phonetik*; Fr. *phonétique*; Ital. *fonologia*. The science of speech-sounds.

Sounds are variously classified: (1) vowels and consonants, the former being characterized by resonance, the latter by noise. (2) Vowels, nasal *versus* non-nasal, according as the nasal cavity shares or does not share in producing the resonance. (3) Vowels, wide *versus* narrow, according as the organs of articulation are

slack or tense. French short *i* is much 'narrower' than the English. (4) Vowels, guttural, *a, o, u, versus* palatal, *e, i*. (5) Consonants, voiced *versus* voiceless, according as the vocal chords do or do not vibrate; *b, d, z*, are voiced, *p, t, s*, are voiceless. In whispered sounds the vocal chords are only rasped by the breath. (6) Guttural consonants are produced by an articulation of base of tongue with the soft palate; palatals by articulation of body of tongue with hard palate; dentals by articulation of tongue-tip or blade with upper gums near front teeth; labials by articulation of lips; labio-dentals by that of lower lip and upper teeth. (7) Explosives or stops *versus* spirants or fricatives, the former characterized by a check or breaking of a check (*p, b, t, d*), the latter by the rasping of breath against point of articulation (*s, z, f, v*). (8) Aspirate *versus* non-aspirate, the former characterized by a vigorous explosion yielding an after-puff of breath; *p-h*, as in *up-hill*. (9) Long *versus* short, according to time occupied. Vowels and spirants may be indefinitely continued; explosives are instantaneous. The application of 'long' to, e.g., the vowel *i* in *pine* is a source of much confusion and should be avoided. (10) Syllabic *versus* non-syllabic. This is a classification according to function, not nature. A sound is syllabic when used as the nucleus of a syllable. A syllable is a group of sounds associated about a free breath. In *captain* (pron. *cápn*) *n* is syllabic, i.e. is 'used as a vowel.' (11) Pitch, quantity, stress. The singing voice differs from the speaking voice in that music emphasizes the pitch by making the changes more distinct and abrupt, i.e. by breaking up the irregular surface of natural ascents and descents characteristic of speaking, into steps and landings. Quantity is time; long vowels are drawled vowels; in *seize* the vowel is long, in *cease* it is short. The *o* in *note* does not differ in quantity from the *o* in *not*; the former is close, the latter is open.

Stress is the relative force in the out-push of breath. In English stressed syllables are commonly of higher pitch. In Swedish, however, stress and pitch are dissociated.

Literature: Sievers, Grundzüge d. Phonetik (4th ed., 1893); Vietor, Elemente d. Phonetik (2nd ed., 1887), and Phonetische Stud. (1887); H. Sweet, Primer of Spoken English (1890); Passy, Étude sur les Changements phonétiques (1890); Bremer, Deutsche Phonetik (1893); Soames, Introd. to Phonetics (1891). (B.I.W.)

Phonology: see Language.

Phoronomy [Gr. *φόρος*, spatial change (a term used technically by Aristotle), + *νόμος*, law]: Ger. *Phoronomie*; Fr. *phoronomie*; Ital. *foronomia*. A technical term in Kant's *Philosophy of Nature*. It means the theory of motion, so far as deducible from *a priori* conceptions, not from empirical observations.

Since space is an *a priori* form of perception, and quantity is an *a priori* function of conception, a pure, rational construction of motion is possible so far as motion can be regarded as a spatial-quantitative fact—namely, as regards (1) direction and (2) velocity. Permanence (q.v.) is the schema of substance as used in constructing phenomena, and is strictly correlative to the idea of change. But change as schematized is motion, which is thus capable of an *a priori* treatment, so far as its concrete presentation or quality can be abstracted from. When this is done, quantity of motion remains (Kant, *Met. Anf. d. Naturwiss.*). (J.D.)

Photometry [Gr. *φῶς*, light, + *μέτρον*, measure]: Ger. *Photometrie*; Fr. *photométrie*; Ital. *fotometria*. The science of the comparison of the intensities of the radiations from different luminous sources and also of the illuminating powers of sources under different conditions, e.g. different distances, angles, &c. The total radiations may be compared; or the radiation of each source may be analysed into its spectrum, and then the radiations of the same period may be compared (spectro-photometry). Cf. Light, under Vision.

There is no absolute standard of light; but various arbitrary standards have been adopted at different times, e.g. 'standard candle,' Hefner lamp, molten platinum, &c. The unit of luminous intensity may then be defined as the amount of luminous energy emitted in one second by a standard source.

Luminous current is defined as the amount of luminous energy emitted from a point-source, which passes out in one second through a unit solid angle (i.e. luminous current equals luminous energy from a point-source divided by 4π).

The illumination at a point is defined as the luminous current divided by the area through this point which closes the solid angle (i.e. in the case of a point-source, illumination is current divided by the square of the distance from the source to the point).

The brightness of a source is defined as the luminous current leaving unit area of apparent surface.

The luminosity of a colour is a measure of its value as an illuminant, and may be determined by suitable means (see Rood, *Amer. J. of Sci.*, xlvi, 1893, 173).

For descriptions of various photometers, reference may be made to the literature (see also the next topic).

Literature: PALAZ, Industrial Photometry; WINKELMANN, Handb. d. Physik, ii. 1; BRODHUN, Photométrie; CREW, Astrophys. J., viii. 299 (1898). (J.S.A.)

Photometry (heterochrome). The science of the determination of the relative intensities of different coloured lights.

Common methods of photometry depend upon varying the objective intensity of one source of radiation until two illuminated fields presented to the eye are seen to be of equal brightness; we have no direct means of estimating how much one surface is brighter than another when they are of unequal brightness. This method becomes very uncertain when the lights to be compared are of different colour (the mean error of observations amounts at best to 6 per cent.), but this is the case which is of special interest to the psychologist. Two other methods are applicable. One is to determine the visual acuity in different illuminations (this is only available for intensities so great that the Purkinje phenomenon does not come into play; for that causes a brightening of certain colours without a corresponding increase of visual acuity, on account of the fact that it increases the effectiveness of the rods only, and hence leaves the fovea unaffected). The other is the so-called flicker-method. This was first suggested by Schafhäutl (*Münch. Abh.*, iii, 1855), but in an imperfect form. The fact upon which it is based—that the duration at maximal intensity of a retinal impression is totally independent of the colour-aspect of the luminous sensation, and is determined by its brightness only—was established with great accuracy by Ferry (*Amer. J. of Sci.*, xliv. 192, 1892). He applied the method to the determination of the relative brightness of the different parts of the spectrum for the normal and for the colour-blind eye, and found the results coincident with those got by the method of visual acuity, but far more exact. The mean error of observations was brought down to 2 per cent. He compared each spectral colour with black, and found that the duration which is just sufficient to prevent flicker (the daylight state of the eye being preserved) is from ·008 to ·036 second. The form of flicker photometry which is usually indicated by the name is that which was proposed by Rood (*Amer. J. of Sci.*, Sept., 1893). In this, instead of alternating a colour-field with black, and getting for each colour the rapidity of alternation necessary to prevent flickering, a minimum rate of alternation is fixed upon, and the brightness of one or the other field is varied until flickering ceases at that rate, the principle being that the least sufficient rate for flicker-extinction is that at which the colours are equally bright.

The method has been applied by Polimanti to the comparison of the central and the peripheral brightness values of the spectrum for normal and colour-defective persons. No statement has been made of the mean error with which these observations are attended, with spectral lights, when the brightness of one field and not the rate of alternation is the variable quantity (*Zeitsch. f. Psychol.*, xix, 1899, 263). (C.L.F.)

Phrenology [Gr. φρήν, heart, mind, + λόγος, discourse]: Ger. *Phrenologie*; Fr. *phrénologie*; Ital. *frenologia*. A system of correlation of mental faculties and sentiments with cerebral regions, which are supposed to correspond to variations in the configuration of the skull.

Formulated by F. J. Gall (1758–1828) and developed by Spurzheim, Combe, and others, it was first termed 'Cranioscopy,' and 'Physiognomy'; but the term phrenology given to the system in 1815 by Forster was adopted by Spurzheim and permanently retained. The antecedents of phrenology are to be found in popular and scientific notions regarding the purpose of the brain as the seat of the emotions and the intellect, current from the times of Aristotle and Galen, through those of the Scholastics to Descartes and the forerunners of modern anatomical science. Gall's work is thus a modern systematization of empirical notions of considerable antiquity and of recognizable parentage. In a similar way the phrenological agitation and discussion regarding brain functions, though contributing little of value, may be said to have been influential in stimulating the interest from which developed the modern doctrines of cerebral LOCALIZATION (q. v.). Phrenology achieved its zenith of fame in the early decades of the 19th century, was zealously attacked and defended by scholars and scientists, and by its striking and practical doctrines caught the popular fancy. It was incorporated by Braid with his theories of

hypnotism, and practical applications were attempted on all sides. It still survives in the propaganda of a limited group of enthusiastic but unscientific writers, and among those who profess phrenology as a vocation.

The system itself was somewhat differently expounded by Gall and by Spurzheim, and has received embellishments in modern hands; but in essence, the surface of the skull was mapped out into a considerable number of areas (26 to 43 or more) covering the so-called organs, the activity of which gave rise to the particular psychological traits or faculties The evidence for the location of the faculties. was extremely crude. That part of the head which seemed well developed in a quarrelsome young man became the place of the organ of 'combativeness'; a portion which Gall believed was prominent in pickpockets was identified as 'acquisitiveness'; the head of a beggar who excused his poverty on account of his pride served to locate 'self-esteem'; a hesitating ecclesiastic and a vacillating councillor with large parietal eminences indicated these parts to be the organ of 'cautiousness'; and so on with even slighter and more fanciful analogy. The division of the faculties recognized the distinction between the feelings and the intellect; it divided the former into propensities (impulses to actions) and sentiments (impulses giving rise to emotions as well as actions), which in turn were higher when peculiar to man and lower when shared by the animals. As types of propensities were 'amativeness,' 'philoprogenitiveness,' 'destructiveness,' &c.; of the lower sentiments, 'self-esteem,' 'cautiousness'; of the higher sentiments, 'veneration,' 'hope,' 'wonder,' 'wit.' The intellectual faculties were perceptive, such as 'individuality,' 'size,' 'language,' 'form,' 'number,' 'tune,' 'eventuality'; or reflective, such as 'comparison,' 'causality.'

Considered critically the system involves on its anatomical side a relation between brain function and cranial formation which does not exist; it opposes certain well-ascertained physiological principles and ignores others. On the psychological side it proposes a system of 'faculties' for which there is either only the most superficial basis, or which stands in direct contradiction to the division of function established by the study of the growth, distribution, and decline of human endowments. On its practical side it involves logical fallacies of the most obvious character, and as a system that proposes to delineate character, and advise in the affairs of life, has the possibility of working serious evil. (J.J.)

Such a scheme as that of the phrenologists is a psychological absurdity. Each of these faculties involves the co-operation of a vast number of fundamental processes, and the same processes enter in varying combination into the constitution of the different faculties. Thus the procedure of phrenology is like that of a man who should assume a different board and a different set of pieces for every game of chess, or a separate alphabet for every word. But the most crushing refutation of phrenology is supplied by what has been ascertained about the modes in which cerebral functions actually are localized. So far as the cortex has been mapped out on good evidence, it is found that the division of function among different parts corresponds not to complex faculties, but to the bodily organs of sensation and movement. One portion of the cortex anatomically connected with the eye is specially correlated with visual consciousness. Another, anatomically connected with the ear, has a similar relation to auditory experience. To take a crucial instance. Language has been regarded by the phrenologists as a distinct faculty with a distinct organ, which is supposed to be peculiarly well developed in actors. As a matter of fact language has been found to involve the functional co-operation of a number of cerebral areas locally separate from one another. (G.F.S.)

Literature: art. Phrenology, in Encyc. Brit., 9th ed. (with citations); works by O. S. and L. N. Fowler. (J.J.)

Phyletic: see Phylum.

Phylogenesis: see Phylogeny.

Phylogeny [Gr. *φῦλον*, race, + *γένεσις*, origin]: Ger. *Stammesgeschichte, Phylogenie*; Fr. *phylogénie*; Ital. *filogenia* (or *-esi*). The ancestry and genetic relationships of an organism.

The results of the study of phylogeny are often graphically expressed by a 'phylogenetic tree.' The process of the evolution or descent of specific forms is called phylogenesis. Cf. Phylum, Evolution, Ontogeny, and Recapitulation. (E.S.G.–J.M.B.)

Phylum [Gr. *φῦλον*, race]. A term introduced by Haeckel (*Gen. Morphol.*, 1866) to designate the great branches or subdivisions of the Vegetable and Animal Kingdoms. Each phylum may include several classes. The corresponding adjective is phyletic. Cf. Classification. (E.S.G.)

Physical Science: Ger. *Physik, exakte*

Wissenschaft; Fr. *science physique*; Ital. *scienza fisica*. In its widest sense, the totality of those branches of science which treat of matter and ether, but make abstraction of all laws peculiar to life. To the Greeks (notably Aristotle) physics was the science of *φύσις* or of what belonged to nature (*φυσικός*). Cf. NATURE, and philosophy of NATURE. (S.N.–J.M.B.)

The most general of these branches is physics, which treats of the phenomena exhibited by matter in general and by ether. Adjoining it on one side is astronomy, which treats of the phenomena growing out of the arrangement and motions of matter in the universe at large, the earth included. Adjoining physics on another side is chemistry, which treats of the special properties peculiar to the different kinds of matter. A connecting link between these branches is chemical physics, which treats of laws that, though common to all matter, are modified in their action by special kinds of matter. Yet more specialized branches of physical science are geology, meteorology, &c., which treat of the action of physical and chemical agencies on the matter composing our globe. Cf. SCIENCE, and MATHEMATICS. (S.N.)

Physiocrats [Gr. *φύσις*, nature, + *κράτος*, power]: Ger. *Physiokraten*; Fr. *physiocrates*; Ital. *fisiocrati*. A school of French economists, in the latter part of the 18th century, who laid stress on food-supply as the basis and measure of the wealth of nations.

The most prominent exponents of the physiocratic theories were Quesnay, Gournay, Dupont de Nemours, and Mercier-Larivière. The most successful physiocratic statesman was Turgot. The physiocratic school represented a healthful reaction against the theories of the MERCANTILE SYSTEM (q. v.), but made the mistake of undervaluing manufactures almost as much as their predecessors had overvalued them. Their most lasting contribution to economic thought lay in showing the advantages of a let-alone policy, as compared with a system of state interference. (A.T.H.)

Physiognomy [Gr. *φύσις*, nature, + *γνώμων*, a judge]: Ger. *Physiognomie* (*-mik*, the theory of); Fr. *physiognomonie, physionomie*; Ital. *fisonomia*. The connection between mental characteristics and external bodily appearance, and the theory of it. (G.F.S.)

The results reached in connection with EMOTIONAL EXPRESSION (q.v.) constitute about all that is positive under this general heading. The term physiognomy is commonly used for the more subtle aspects of expression, principally of the face. Names especially associated with the subject are Lavater, Ch. Bell, Piderit, Duchenne, and Darwin.

Literature: Encyc. Brit., art. 'Physiognomy,' with full citations. (J.M.B.)

Physiological Acoustics: see ACOUSTICS, and HEARING.

Physiological Dispersion Circle: Ger. *physiologische Zerstreuungskreise*; not yet in use in French and Italian. If a group of black dots on white paper is looked at from too great a distance, or with too little illumination, or for too short a time to be sharply discriminated, the dots fuse into a grey blotch, exactly as if they were seen with incorrect accommodation. In the last case, the dots are said to be seen in (physical) dispersion circles. Exner proposes to use the term physiological dispersion circles for the other two cases.

The phenomena are due to the overpassing of the localization-power of the retina. If the spots are of different colours, the colours are fused in accordance with the ordinary laws of colour fusion. See S. Exner in *Pflüger's Arch.* (1898). (C.L.F.)

Physiological Optics: see OPTICS, and VISION.

Physiological Psychology: see PSYCHOLOGY (physiological).

Physiological Selection: Ger. *physiologische Auslese* (or *Selektion*); Fr. *sélection physiologique*; Ital. *selezione fisiologica*. The theory, due to G. J. Romanes, that variations in fertility between individuals produce groups and lead to divergent or polytypic evolution by the principle of ISOLATION (q. v.). (J.M.B.)

The theory regards STERILITY (q. v.) 'as itself the cause of specific differentiation,' acting as a physiological barrier enabling varieties so isolated to diverge into separate species, and leading to the establishment of new characters, just as in the case of individuals of a species cut off by geographical barriers (see NATURAL SELECTION, ad fin.). Cf. FERTILITY, and SELECTION (in biology).

Literature: G. J. ROMANES, On Physiological Selection, Proc. Linn. Soc., v. 19 (1886), and Darwin and after Darwin, iii; K. PEARSON, The Grammar of Science (2nd ed., 1900). (E.S.G.)

Physiologists and **Physicists** (Greek): see PRE-SOCRATIC PHILOSOPHY (Ionics).

Physiology [Gr. *φύσις*, nature, + *λόγος*, science]: Ger. *Physiologie*; Fr. *physiologie*; Ital. *fisiologia*. (1) Science of the functions of living organs and organisms, plant and animal.

By a natural differentiation of the sciences, the word has lost its etymological signification, which would make it mean 'natural philosophy' or the science of all nature. Chemistry and physics now cover the field of non-living matter, physiology that of living matter. Further differentiation, in which anatomy, in its various branches, and morphology deal with forms and relations of organs and organisms, has left to physiology the field of the activities or functions of living things. It is 'the sum of our knowledge concerning the properties of living matter' (Howell in *Amer. Textbook of Physiol.*); the 'science of the vital phenomena of organisms'; 'the doctrine of life' (Landois). Since the growth and formation of an organ or organism is a function of its embryological stages, physiology must remain as a science fundamental to both anatomy and morphology. Conversely, anatomical relations may be used in a limited way to indicate physiological conditions. (C.F.H.)

(2) Sometimes applied, in the expression 'mental physiology,' to the functions of the mind, as in Carpenter's and in Maudsley's *Mental Physiology*. (J.M.B.)

Pico della Mirandola, Giovanni, Count of Mirandola, and Prince of Concordia. (1463–94.) Educated in Bologna and schools of Italy and France. At Florence (1484) he became intimate with the 'Academy,' a circle of Platonists. Sought to reconcile Plato with Aristotle, religion with philosophy. Became a mystic. Charged with heresy by Pope Innocent VIII; absolved by Alexander VI.

Pictograph: see IDEOGRAM.

Pictorial Art: see ART AND ART THEORIES, and CLASSIFICATION (of the fine arts).

Picture (mental): see IMAGE (mental).

Picturesque [Lat. *pictura*, from *pingere*, to paint]: Ger. *malerisch, pittoresk*; Fr. *pittoresque*; Ital. *pittoresco*. (1) Appropriate for a picture, or (as applied to language) adapted to raise vivid images or pictures in the mind of the reader or hearer.

(2) A species of aesthetic value characterized especially by the features of ruggedness or irregularity (as contrasted with the beautiful in the narrowest sense, especially with the symmetrical), but without the degree of power or magnitude belonging to the sublime. Its aesthetic value seems to be derived largely (*a*) from its character of novelty, (*b*) its consequent vividness and suggestion of animation, (*c*) its promotion of the aesthetic attitude by the banishing of the utilitarian, and by the suggestion of freer or more purely natural or historic associations, as is seen in a picturesque ruin.

(3) In painting, applied to the effect produced by sudden contrasts of lines or of light and shade; in drawing, a freer as contrasted with a severer manner.

The term was used by Dubos (1719), in the sense first named under (1)—still the meaning of the German malerisch. In English it was (according to Stewart) first applied to language, the second use under (1) above, and later to landscape. Price used it to cover aspects of aesthetic value excluded by Burke's definitions of the beautiful and sublime.

Literature: UVEDALE PRICE, On the Picturesque, ed. Lauder (1842); STEWART, Essay on the Beautiful, vol. v of Works, chaps. iv and v; BEGG, On the Devel. of Taste (1887), chap. xii; WÖLFFLIN, Renaissance and Barock (1888). Cf. GROTESQUE, and FANTASTIC. (J.H.T.)

Pietism [Lat. *pietas*, piety]: Ger. *Pietismus*; Fr. *piétisme*; Ital. *pietismo*. (1) A reactionary movement which arose in the 17th century in the German Lutheran Church, against the one-sided intellectualism of the current orthodoxy, and in favour of a more vital religion of the heart and life.

(2) Any religious system or movement which tends to substitute mystical communion and emotional experience for clear conceptions and assured convictions.

The Pietistic movement arose at Frankfort in 1670 under the leadership of Spener, who founded the Collegia Pietatis, or meetings for spiritual communion, in connection with which the name Pietist arose. The movement finally disappeared, not, however, without powerfully affecting the religious life of Europe.

Literature: Hist. of Pietism, by SCHMID (1863), by HEPPE (1870), and by RITSCHL (1880). (A.T.O.)

Pistology (in theology) [Gr. *πίστις*, faith, + *λόγος*, science]: Ger. *Glaubenslehre*; Fr. *doctrine de la foi*; Ital. *dottrina della fede*. The systematic treatment of the organ and content of faith or belief, as distinguished from knowledge and rational apprehension.

In early Christian thinking the *pistis* was distinguished from the *gnosis*, and the problem of the first philosophical minds was how to make the transition from faith and dogma to reason and science. This problem gave rise to Christian philosophy. The early forms of gnosticism were more or less abortive efforts to philosophize the contents of the faith.

Ultimately a differentiation was effected between the philosophical and the more strictly theological branches of the movement, and the development passed out of the earlier into the scholastic stage.

Literature: Histories of philosophy and theology. (A.T.O.)

Pitch [AS. *pic*, height, point of reach]: Ger. *Tonhöhe*; Fr. *diapason, hauteur du son*; Ital. *diapason*. The quality of tonal sensation, expressed by musical symbols (c^4, a_1, B, d''', &c.), or by statement of vibration rate, number of vibrations per second (c of 256, e of 640); with which it is correlated. (E.B.T.)

Pithecanthropus erectus (Dubois): see Anthropoid (ad fin.).

Pity [OF. *pite*, from Lat. *pietas*, piety]: Ger. *Mitleid*; Fr. *pitié*; Ital. *pietà*. Fellow feeling with the added consciousness that, by reason of some quality or possession of one's own, the untoward condition could not be true of oneself.

This latter qualification marks off pity—and with it compassion, in which there is a touch of mercy, or, in cases of personal injury, of forgiveness—as a special case of Sympathy (q. v.). It is recognized, but inadequately, in the popular descriptions of pity as involving superiority, condescension, and as being exercised only towards 'inferiors.' (J.M.B.)

Hobbes applied his principle of the absolute selfishness of human nature to the case of pity, which he defined as 'imagination or fiction of future calamity to ourselves, proceeding from the sense of another man's calamity' (*Human Nature*, chap. ix). Hutcheson maintained, as against this view, that pity is a disinterested and natural sentiment. 'The frame of our nature, on the occasions which move these passions, determines us to be thus affected, and to approve our affection' (*Inquiry*, sect. ii). Butler also holds that pity or compassion is a public affection, directed to 'the good of our fellow creatures' or 'the interests of others.' It is the product of 'a mutual sympathy between each particular of the species, a fellow-feeling common to mankind.' 'For does not everybody by compassion mean an affection, the object of which is another in distress?' (*Sermons*, v. § 1, Note). Similarly, Spinoza defines pity or 'commiseration' as 'pain accompanied by the idea of evil happening to another whom we imagine to be like ourselves' (*Ethics*, Pt. III, 'Definitions of the Emotions,' Def. 18). As pain, it is, in itself, evil; but its result is good, namely, the endeavour, from the dictates of reason alone, to free from misery the man we pity. 'It follows that a man who lives according to the dictates of reason endeavours as much as possible to prevent himself from being touched by pity' (Pt. IV, Prop. 50, coroll.). Cf. Adam Smith, *Theory of the Moral Sentiments*, Pt. I, sect. i. chap. i. (J.S.)

Plan: see Project.

Plan of Salvation: see Salvation.

Planchette [Lat. *planca*, Gr. πλάξ, a plane, through Fr.]: Ger. *Münzplatte*; Fr. *planchette*; Ital. *tavoletta*. An apparatus for recording delicate movements of the hand, used in experiments on the influence of the subject's thought, or of that of some other personality, upon his hand movements. Cf. Muscle Reading. (J.M.B.)

Plant [AS. *plante*]: Ger. *Pflanze*; Fr. *plante*; Ital. *pianta*. An organism whose marks of distinction from an Animal (q. v.) are indicated under the latter topic. The sciences which deal with plants are biology and botany. Plants constitute the Vegetable Kingdom. See Biological Sciences. (J.M.B.)

Plasm [Gr. πλάσμα, anything formed or moulded]: Ger. *Plasma*; Fr. *plasme*; Ital. *plasma*. Hypothetical component parts of the protoplasm or nucleus, having a special function. See Cell.

Weismann assumes a 'germ-plasm'; Nägeli, a 'nutritive plasm,' &c. (C.S.M.)

Literature: Y. Delage, La Structure du Protoplasma et Biol. Gén. (1895); Wilson, The Cell. (E.S.G.)

Plastic Imitation: Ger. *plastische Nachahmung*; Fr. *imitation plastique*; Ital. *imitazione plastica*. (1) See Imitation (1).

(2) Used by Groos (*Play of Man*, Eng. trans., 313 ff.) for constructive or creative imitation, as in 'plastic' art. (J.M.B.)

Plasticity [Gr. πλαστός, from πλάσσειν, to mould]: Ger. *Plasticität*; Fr. *plasticité*; Ital. *plasticità*. That property of living substance or of an organism whereby it alters its form under changed conditions of life.

The two theories of the manifestation of plasticity hold respectively (1) that it is a response to stimulation from the environment, the original property being simply general instability of structure not involving tendencies towards specific modifications of any sort; and (2) that it takes the form of specific changes which are inherent in life as such, the environment playing a secondary and purely exciting rôle. This latter is the view of those who accept Vitalism (q. v.).

As to the origin of plasticity, the views

associated with the first theory mentioned above are (*a*) that it is merely the original instability of protoplasm, or (*b*) that it is due—especially in the higher forms, as is seen in the plasticity of the brain substance—to natural selection, and is a necessity for ontogenetic development. The second theory given above—that of vitalism—holds that plasticity of the specific sort which it accepts is a fundamental property of life and explains phylogenetic evolution.

It is probable—or possible—that there are two forms of plasticity: (*a*) that of the living cell wherever found, and of the lowest organisms, by which they respond to various sorts of stimulation; and (*b*) that of the differentiated and developed structures and organisms whose modifications and variations are within certain defined and well-marked limits for each. It is possible, indeed, that this latter case illustrates the natural selection of certain modifications, i. e. those which served useful ends. In this case the fixity of organic structure, together with its secondary plasticity, has been acquired by the gradual restriction of its original plasticity: thus, according to recent writers (Bailey, Williams, A. Sedgwick), heredity itself as a function may have arisen. There would seem, however, to be no reason to doubt that both processes are true: (1) the gradual reduction of original plasticity and variability, securing certain great organic structural results from which, (2) as a basis, has arisen, through evolution, the relative plasticity of brain, nerve, &c., which allows newer, and especially intelligent, accommodations.

Apart from vital plasticity in general, the facts of individual accommodation make the nature and limits of brain plasticity a matter of great interest. Plasticity underlies all acquisition—especially motor acquisition—and learning. As a matter of endowment, it is contrasted with the fixity of instinct and reflex action; a contrast which, on the psychological side, is seen in educability or the lack of it (see EDUCATION). Cf. ACCOMMODATION (in biology and psychology).

Literature: see LIVING MATTER, NERVE STIMULATION AND CONDUCTION, ACCOMMODATION (in biology); see also BIBLIOG. G, 2, *f*.

(J.M.B., E.B.P.)

Plato. (429–348 B.C.) Son of Ariston; pupil of Socrates. At military age he probably took part in campaigns of the army. Draco and Epicharmus taught him music, or, at least, poetry. After the execution of Socrates (399 B.C.), he went to Megara and reviewed the Eleatic doctrine; travelled in Ionia, Cyrene, and Egypt, later in Italy, where he learned more in regard to the Pythagoreans. Owing to a disagreement with the elder Dionysius in Syracuse, he was deprived of his liberty at Aegina. Upon recovering his freedom through the intervention of the Cyrenaic Anniceris, he returned to Athens, and opened his school. He made two fruitless journeys to Sicily, but aside from these he taught in Athens until his death. Born at Athens, his real name was Aristocles. See SOCRATICS (Plato), and cf. NEO-PLATONISM, GREEK TERMINOLOGY, and the principal philosophical topics generally.

Platonism: see SOCRATICS (Plato).

Play [AS. *plegan*, to play]: Ger. *Spiel*; Fr. *jeu*; Ital. *giuoco*. The exercise of any one of the functions of mind and body in a way usually covered by such expressions as 'play is for its own sake,' 'play is not serious,' 'play involves make-believe,' 'play is an indulgence and is contrasted with work,' i. e. with no conscious reason for it except the indulgence itself.

These general characterizations serve to raise the question as to what is the least distinguishing mark of play as contrasted with serious function. This question is discussed from two points of view, the biological and the psychological, which illustrate a distinction in the definition of end or purpose.

Biologically, we have two main theories: the 'surplus energy' theory of Spencer which makes play the using up of surplus energy already accrued to the organism. Play is then an exercise which brings out, generally in an imitative way, the functions whose end is usually strenuous life under stress of the environment. The other theory is the 'practice' theory, urged strongly by Groos, though suggested by earlier writers; it holds that play is a native impulse, not always imitative, whose biological end and utility is to secure practice in the performance of the essential functions of life before they are actually demanded by the exigencies of living. A third theory—rather more physiological—makes play a means to the recuperation of other functions during periods in which the functions set in play are in exercise.

On the psychological side, two main characters have been suggested by different writers as essential to play. SEMBLANCE (q. v.), with a certain 'self-illusion,' or indulgence in conscious 'shamming,' is to some (v. Hartmann, L. Lange) the psychological essential. To

others (Groos' later view, in *The Play of Man*) a function is playfully exercised when it is performed for the sake merely of the pleasure of the action itself. Play is 'autotelic'—its end lies in itself.

The latter of these theories evidently makes the psychological criterion of play much simpler, and so gives to the play-psychosis a broader range. It would seem possible that the biological criterion of play—whichever of the above-noted suggestions we adopt—might be present without any constant psychological play-criterion in force at all; that is, biological play might sometimes be psychological earnest. The general theory of evolution requires only that the criterion on one side or the other have reference to utility.

The subject of play has important bearings in connection with ART AND ART THEORIES (q. v.), with education, and with SOCIAL DEVELOPMENT (q. v.).

The forms of play, known as games, are innumerable, and may be classified under certain great heads, e. g. games of skill, of endurance, of chance, &c. Groos (*Play of Man*, Eng. trans.) divides them according to the functions primarily brought into exercise. The element of personal competition or rivalry seems to be the main impulse in certain games, and that of chance in others, though in many games there is a union of these two great factors. Games of chance have always exercised peculiar fascination and given rise to GAMBLING (q. v.); they are peculiarly human. Theoretically, they are of interest as involving the theory of PROBABILITY (q. v.). Cf. Pearson, *The Chances of Death*, i. 42, and citations in Groos, op. cit.

Literature: GROOS, The Play of Animals (see German edition for a full bibliog.); and Play of Man (Eng. trans., 1901); SPENCER, Princ. of Psychol.; ALIX, L'Esprit de nos Bêtes; BREHM, Das Thierleben; GUTS MUTHS, Spiele zur Uebung u. Erholung; HARTMANN, Philos. of the Unconscious; HUDSON, The Naturalist in La Plata; K. LANGE, Die bewusste Selbsttäuschung; LAZARUS, Ueber die Reize des Spiels (1883); COLOZZA, Il Giuoco nella Psicol. e Pedagogia (1896); STANLEY, Evolutionary Psychol. of Feeling; BALDWIN, Ment. Devel. in the Child and the Race; Social and Eth. Interpret.; and Story of the Mind; HARRIS, Psychol. Foundations of Educ., 281 ff.; SCHALLER, Das Spiel und die Spiele (1861); Kindergarten literature generally. (J.M.B.)

Play-impulse: Ger. *Spieltrieb*; Fr. *instinct du jeu*; Ital. *impulso al giuoco*. The impulse to indulge in play. Cf. IMPULSE, and PLAY.

This term is better than play-instinct—that is, provided impulse and instinct be employed in the uses recommended in this work—for reasons well stated by Groos (*Spiele der Menschen*, 365 f., 486). The principal reason is that play is a general function, discharging itself through any or many modes of activity, and not restricted—as instincts are—to a definite and uniform mode. To those, however, who use the term instinct—a usage which is full of ambiguities—to apply to all inborn tendencies, play-instinct is a legitimate expression. (J.M.B.)

Play-theory (in art): see ART AND ART THEORIES.

Pleasantness (1) and (2) **Unpleasantness**: Ger. (1) *Lust, Wohlgefallen, wohlgefällig* (adj.), (2) *Unlust, Missfallen* (Judd); Fr. (1) *plaisir, agrément*, (2) *peine, désagrément*; Ital. (1) *piacere*, (2) *dispiacere*, (1) *aggradevole* (adj.), (2) *disaggradevole* (adj.) (E.M.). Cf. TERMINOLOGY (German and French). See PAIN AND PLEASURE (2).

Agreeableness and disagreeableness are sometimes used, but the terms given are preferred. (J.M.B., G.F.S.)

Pleasure: see PAIN AND PLEASURE.

Pleasure (aesthetic) [Old Fr. *plaisir*; Lat. *placere*, to please]. Pleasant feeling aroused by what is aesthetic. Cf. PAIN AND PLEASURE (2). (1) The word is generally applied by aestheticians to any psychosis whose dominant tone is pleasant, whether it also contains unpleasant elements or not. (J.R.A.–J.M.B.)

(2) It is occasionally employed, after a narrower psychological usage, to designate the affective aspect or phase of an aesthetic state, in distinction from the total psychosis of which this is a part.

On biological grounds aesthetic pleasure has been distinguished from other kinds of pleasure: (1) as springing from activities remote from the life-serving functions (Spencer); (2) as connected with the relatively passive use of a well-nourished end-organ, in this case either eye or ear (Grant Allen).

On psychological grounds aesthetic pleasure has been differentiated: (1) as attaching to certain senses only, i. e. sight and hearing (Bain); (2) by its contemplative attitude (among others Ladd), and (3) its possibility of indefinite prolongation (Sully); (4) as stimulating psychical life-activity under all three of its forms, sensibility, intellect, and will

(Guyau); (5) as the concomitant in feeling of the free, unimpeded activities derived from the play-impulse (Schiller); (6) as felt to inhere in the object after the manner of sensational attributes like colour and weight (Santayana); (7) as arising from the appropriate relation of a perceived impression to the reproductive processes which it arouses (Külpe); (8) as involving relative permanency of pleasantness in revival (Marshall); (9) as due to the 'play of inner imitation' (Groos); (10) as an aesthetic form of sympathy (Lipps).

On grounds other than psychological, aesthetic pleasure has been still further distinguished, (11) by its shareability and disinterestedness (Kant, Schopenhauer), and (12) by its universality (Kant). This last distinction excludes mere pleasures of sense, which are, as such, individual, from the realm of the aesthetic, and furnishes a basis for the demarcation of the beautiful from the agreeable. Compare also Feeling (aesthetic), Pain (aesthetic), Aesthetics, and Beauty.

Literature: Bain, Emotions and Will, 3rd ed. (1875); Guyau, Les Problèmes de l'Esthétique contemporaine (1897); Marshall, Pain, Pleasure, and Aesthetics (1894); Ribot, The Psychol. of the Emotions (1897); Santayana, Sense of Beauty (1896); Bosanquet, Hist. of Aesthetic (1892). (J.R.A.)

Plenary Indulgence: Ger. *vollkommener Ablass*; Fr. *indulgence plénière*; Ital. *indulgenza plenaria*. A dispensation of the Roman Catholic Church by virtue of which all the temporal punishment due to sin is remitted, the dispensation being conditioned on the prior remission of the mortal guilt and eternal penalty of the sin through repentance and confession.

The institution of indulgences probably arose in connection with the Sacrament of Penance. It is of early origin and is founded on the presumed existence of a surplus of merit from Christ's death after the sins of the world have been atoned for, over which the Church through its possession of the keys has a dispensary power. The abusive exercise of this power was one of the occasions of the Reformation.

Literature: Pusey, Irenicon, Pt. I. 207; Cramp, Textbook of Popery; Herzog's Real-Encyc., i. 67. (A.T.O.)

Plenary Inspiration: Ger. *vollkommene Eingebung*; Fr. *inspiration plénière*; Ital. *inspirazione plenaria*. The theory that the human authors of the Old and New Testament Scriptures were so inspired and directed by God as to be preserved from error and enabled to express the infallible mind of God. See Inspiration.

The doctrine of Plenary Inspiration carries with it that of the inerrancy of the message. It does not, however, extend to the human agency of transcription, &c., and the current claim of inerrancy is made, therefore, only in connection with the original manuscripts.

Literature: Gaussen, Theopneusty (Eng. trans., N. Y., 1842); Elliott, Inspiration of the Holy Scriptures; also references under Inspiration. (A.T.O.)

Plenum [Lat. *plenus*, full]: Ger. *continuirliche Raumerfüllung*; Fr. (*le*) *plein*; Ital. (*il*) *pieno*. The existence of matter in every portion of space; matter (or its energy) filling space in such a way as to exclude the possibility of any void or Vacuum (q.v.). (J.D.)

Pleroma [Gr. πλήρωμα, fullness]: Ger. *Pleroma*; Fr. *plérôme*; Ital. *pleroma*. A term used by Gnostics (q.v.) to designate the spiritual world intermediate between God and man. It is filled through and through with divine energy, and thus opposed to κένωμα, the spatial void.

It is a matter of dispute as to how the Gnostic use is derived from St. Paul's use of the term (Eph. i. 23, iii. 19, and iv. 13; Col. i. 18, 19, ii. 9), and how far St. Paul himself used the term in its philosophic connotation.

Literature: Teichmüller, Gesch. d. Begriffe; Matter, Hist. du Gnosticisme; Mansel, Gnostic Heresies, 51–5, 178, 179 f. (J.D.)

Pletho, surname of **Georgius Gemistus**. (1355–1450.) Born in Constantinople, he held a judicial position in the Peloponnesus, when the Emperor John Palaeologus (1438) took him to Italy to labour for the union of the Greek and Roman Churches. As a pagan he did not wish to see them united, and laboured for their further separation. Spread his own doctrines in Ferrara and Florence, and organized in the latter place a society of Platonists under the patronage of Cosimo dei Medici. The society was called the Academy.

Plethysmograph: see Laboratory and Apparatus, III, B, (1).

Plexus [Lat. *plexus*, woven]: Ger. *Plexus*; Fr. *plexus*; Ital. *plesso*. An interconnected whole where each part is so dependent upon every other part that no adequate account of one constituent can be given apart from its associates.

It is differentiated from the terms System and Organism (q. v.) in denoting *de facto* rather than ideal or teleological connection.

It connotes more internal dependence, however, than does the term aggregate. (J.D.)

Plexus (in neurology): Ger. *Nervennetz*; Fr. *plexus, réseau*; Ital. *plesso* (*nervoso*). (1) A group of anastomosing fibres outside the central nervous system, especially in the course of the peripheral nerves. It is best to refer to these as Nerve-plexuses or Neuroplexuses.

The term does not imply protoplasmic union, but merely the interweaving of nerve-fibres. Protoplasmic union of dendrites and neurite processes of cells may be termed Neuroreticulum. Cf. NEUROPILEM.

(2) Disperse ganglia, especially those of the SYMPATHETIC SYSTEM (q. v.; cardiac, mesenteric, and hypogastric plexuses). Such an aggregate may be termed a Ganglion-plexus.

(3) Vascular intrusions of the tela (cf. BRAIN) or thin parts of the neural tube into the cavities of the brain. Often in combination, as Metaplexus. The descriptive adjective 'choroideus' is now frequently omitted. (H.H.)

Plotinus. (205–270 A.D.) Born at Lycopolis, Egypt, he went to Alexandria, 232, and for ten years studied under Ammonius Saccas. In 242 he accompanied the Emperor Gordianus to Persia to learn the Persian and Indian philosophies: the emperor was murdered, and he went to Rome, where he taught philosophy with great success. Retired into solitude, 269. Cf. NEO-PLATONISM.

Pluralism [Lat. *plures*, several, many]: Ger. *Pluralismus*; Fr. *pluralisme*; Ital. *pluralismo*. The theory that reality consists in a plurality or multiplicity of distinct beings.

It may be materialistic, as with the ATOMISTS; hylozoistic, as with Empedocles; or spiritualistic, as with Leibnitz. Or, again, it may be conceived as indifferent, as the unknowable reals of Herbart which produce the phenomena both of consciousness and of matter. While opposed to monism as a theory of the essential and ultimate unity of all being, it may agree with it in opposition to a dualistic theory of the opposition of subject and object. The chief difficulties with the system are (*a*) in the idea of God (as with Leibnitz it seems to be both the highest of the monads, and the system of monads as such), and (*b*) in the ideas and facts of relationship, order, law, or harmony: if this harmony exists, we seem to have not a sheer plurality, but already an organized system; if it does not we have only chaos, no universe; and (*c*) in the idea of interaction. This, however, may be regarded only as a special case of (*b*).

It need hardly be mentioned that we have here to do with one of the most serious problems of philosophy; one which was among the earliest to attract attention, and about which the conflict is most stubborn. The needs which pluralism endeavours chiefly to serve are (1) the possibility of real change, or an objectively valid dynamic view, since monism seems to make change a mere incident in the totality of being, or even a partly illusory phenomenon (Heraclitus and Hegel, however, seem to be dynamic monists in asserting the one reality to be essentially process); (2) the possibility of real variety, particularly in the differences of persons, as monism appears to lend itself to a pantheistic view, regarding all distinctions as simply limitations of the one being; (3) the possibility of freedom, as a self-initiating and moving power inherent in every real *qua* real.

The term pluralism is very recent in English (it is used as early as Wolff in German). Kant uses the term as opposed to egoism and solipsism—the tendency to regard self as only one among many (*Anthropology*). Bowne uses the term incidentally in *Philos. of Theism*, 57; James has probably done more than any one else to give it currency, in his *Will to Believe* (see Preface in particular); and Howison employs it to denote the substantially distinct existence of free ethical personalities (*Limits of Evolution*, and in Royce's *Conception of God*, xiv). (J.D.)

Plurality [Lat. *pluralis*, numerous]: Ger. *Vielheit, Mehrheit*; Fr. *multiplicité, pluralité*; Ital. *pluralità*. More than oneness. See MANIFOLD, MULTIPLICITY, and (especially) UNITY and PLURALITY. Cf. also NUMBER.

According to Eucken (*Philosophische Terminologie*, 63), Scotus Erigena was the first to use *pluralitas* as a technical philosophical term. (J.D.)

Plurality of Causes: Ger. *Mehrheit der Ursachen*; Fr. *pluralité des causes*; Ital. *pluralità delle cause*. John Stuart Mill, in his *System of Logic*, III. v. 3, argues that 'the cause, philosophically speaking, is the sum total of the conditions positive and negative taken together; the whole of the contingencies of every description, which being realized, the consequent invariably follows.' This has been called the doctrine of 'Plurality of Causes.'

This doctrine was not at all new when Mill's *Logic* was put forth. It had been the general view since the Aristotelian phraseology had been given up, and had even been

common under the Aristotelian régime, although the word cause was then loaded down with many different meanings. But when Aristotelians used such phrases as the cause of a *thing*, or of an historical *event*—not of any *fact*, or abstract element of the event, expressible by a proposition, but of the whole *event* in its concreteness, such that no proposition, or book of propositions, or library of books of propositions, could begin to describe it adequately,—when Aristotelians used such phrases, of course they must mean something quite different by a cause, or efficient cause; and in fact we find that they fully recognized that any concrete thing or concrete event has multitudes of 'efficient causes.' In some cases they were able to mention one of these as the *principalis efficiens*. In other cases they spoke of one cause as being *principalior* than another. The Aristotelian doctrine did an incalculable amount of practical mischief, due to its utter confusion; and this confusion was owing to the attempt to give a meaning to the efficient cause of a concrete thing or concrete event.

Mill recognizes the enormous importance of clearing up the notion of cause. 'The notion of cause,' he says, 'should be, with the utmost practicable degree of precision, fixed and determined.' Nevertheless, so far is he from making his reader understand that the logical antecedent and consequent are not concrete things or events, but abstract elements thereof precisely and fully expressible by propositions, that after repeated re-readings of what he says, both in his *Logic* and elsewhere, one can but be left extremely doubtful whether Mill regarded the effect, or consequent, as a concrete event (he often says it is 'an event') or an abstract element of an event. He, and still more his followers, often seem to speak as if there were no single cause of an effect, in most cases. (C.S.P.)

It seems evident, however, that Mill—'speaking philosophically,' as he says—is not concerned with mere logical or abstract antecedence and consequence, but with the statement of the 'sum total of the conditions' of a concrete event. Modern idealism puts the same truth, 'philosophically speaking,' in the doctrine that reality is a system the statement of which in its entirety is necessary for the statement of any part (fact, event, &c.) of it. See CAUSE AND EFFECT, and CAUSE AND CONDITION. (J.M.B., K.G.)

Plutarch. (cir. 46–cir. 120 A.D.) A famous Greek essayist and biographer. His writings show a mingling of doctrines from various sources, Greek, Egyptian, Persian, and Italian. Cf. ALEXANDRIAN SCHOOL.

Pneuma [Gr. *πνεῦμα*, air, breath, spirit]. The vital soul or animating spirit.

It can be defined, however, only with reference to its historical use. Few terms, indeed, embody within themselves a more interesting combination of various sources and motives than does this one. The three chief elements in it are derived from Greek philosophy, from Greek medical science, and from Hebrew religion. The air was conceived as active (the wind) in Greek thought, and as a source of life in plants, animals, and men. Anaximenes, because of its restless, apparently self-caused, activity and its obvious connection (in breathing) with life, identified air with the soul of the universe and of the individual. While subsequent philosophy limited its scope and value, pneuma was universally accepted as a fact, and as something in man which mediated between his life and the larger world, and also between his strictly physiological functions and his higher spiritual nature. Through its relation to warmth (the living body is always warm and always inhaling air) it is the force which organizes the matter of the body, permeating, because of its fineness and activity, all parts. The Greek physicians accepted this doctrine and elaborated it. Praxagoras discovered the distinction between veins and arteries, and regarded the latter as carrying air (since they are empty in a dead person), the former blood; the circulation of this air stands in close relation to health and sickness. His successors regarded this circulation as most important in travelling between the heart as vital centre and brain as centre of thought, and hence as in some sense a connecting link of the physical and psychical.

Meanwhile, the later Peripatetics had taken up the tale and made the pneuma the physiological basis of all psychical activities. The Stoics made the conception (again as with Anaximenes) a cosmic one—it is the objective union of the spiritual and material, God and the world. Earth and water are only condensed air (pneuma), and the psychical is but the highly refined residuum. Meantime Hebrew thought had also conceived the soul as primarily a form of 'air,' and made no difference between it, the wind, and respiration. But since it is regarded (in the Old Testament) as breathed into man by God, it loses its materialistic connotations; it is

regarded as something coming into the body from without, instead of being its immanent function; and as the Spirit, itself immaterial, which rules matter. Philo attempted to unite the Greek and Hebrew conceptions, making the pneuma a mediating principle between God (Spirit) and the world (Matter). In the New Testament, it is Spirit *par excellence*, not simply in the psychological sense, but in the ethical—in the sense we associate with the term 'spiritual,' largely, indeed, just because that word was chosen to translate pneuma. Man consists, as with the Greeks, of body, soul, and spirit (pneuma), but spirit is elevated above the soul, not subordinated to it. The concept thus entered radically into the whole mediaeval and modern conception of spirit, and of soul and mind, and was certainly one of the chief factors in developing the concept of soul as a substantial, although wholly immaterial, entity. On the physical side, the doctrine passed over into the theory of animal spirits, and thus played, with Descartes, the same function of connecting soul and body that it had exercised with the Greeks. See Siebeck, *Gesch. d. Psychol.*, ii. Part II. chap. i. (J.D.)

Pneumatograph: see LABORATORY AND APPARATUS, III, B (1).

Pneumatology [Gr. πνεῦμα, spirit, + λόγος, theory, doctrine]: Ger. *Pneumatologie*; Fr. *pneumatologie*; Ital. *pneumatologia*. (1) Literally, the doctrine of spirits, God, angels, and man. See PNEUMA. But, as a matter of fact, the term was chiefly used as the theory of spirits intermediate between God and man, angels and demons, i. e. good and bad. The term was largely appropriated by astrology and magic, though theology continued to use it in its proper sense. In the 17th century it had some vogue (largely in the form pneumatics) as the equivalent of what is now termed psychology. See Franck's *Dict. des Sci. philos.*, sub verbo. (J.D.)

(2) In theology: see PSYCHOLOGY (empirical and rational).

Point [Lat. *punctum*, a small hole, through Fr.]: Ger. *Punkt* (*Punktdistanz*); Fr. *point*, *distance ponctuelle*; Ital. *punto*. (1) The unit of distribution of the apparatus of sensation on the skin and mucous membrane.

So we speak of 'hot points,' 'pressure points,' 'pain points,' &c. Since some of these points are areas of considerable extent (see TEMPERATURE SPOT), it is better to speak of them as 'spots' ('cold spots,' 'pain spots,' &c.).

(2) The unit of space discrimination by the eye: as 'luminous point,' &c.

(3) In geometrical optical illusions, a 'point distance' is an extent of space bounded by two points, an undrawn line. (E.B.T.)

Point (in geometry). That which we conceive to have position, but not magnitude. (S.N.)

Poiret, Pierre. (1646–1719.) A French Protestant divine and mystical philosopher who held pastorates at Hamburg and Amsterdam.

Polemics (in theology) [Gr. πολεμικός, warlike]: Ger. *Polemik*; Fr. *polémique*; Ital. *polemica*. That branch of Christian apologetics which has for its aim aggressive warfare upon the foes of Christianity either within or without the Church.

Polemics is opposed to irenics, whose aim is the cultivation of friendly relations. Historically, polemics has dealt chiefly with heresies within the Church. It was first reduced to systematic form by the Jesuits, whose example was soon followed by the champions of Protestantism. Since Schleiermacher, polemics has been recognized as part of theological discipline.

Literature: SCHLEIERMACHER, Darstellung des theol. Stradismus (Berlin, 1811); SACK, Christl. Polemik (Bonn, 1838); HALL, Syst. of Divinity (N.Y., 1847); MCCLINTOCK and STRONG, Cyc. of Bibl. Knowledge (1873). (A.T.O.)

Policy (in law), **Policy of the Law** [Gr. πολιτεία]: Ger. *Staatsklugheit*; Fr. *politique*; Ital. *polizia*. Those general purposes of the municipal law of a state, not declared by statute, which its courts recognize and enforce as necessary for the protection of society.

Public policy, sound policy: those general purposes of civil government, not declared by statute, which the courts, in the absence of a statute to the contrary, recognize and enforce as necessary for the protection of society. 'Many contracts which are not against morality are still void as being against the maxims of sound policy' (Jones *v.* Randall, 1 Cowper's Law Reports, 39). 'Contracts illegal at common law, as being contrary to public policy, are such as injuriously affect or subvert the public interest' (Sedgwick *v.* Stanton, 14 N.Y. Law Reports, 291). *Policy of the state*: a general purpose manifested by a long course of legislation on some object, which courts take into view in construing any particular statute on that subject. (S.E.B.)

Political Economy: see ECONOMIC SCIENCE.

Political Institution: see INSTITUTION.

Politics [Gr. πολιτική, the science of government]: Ger. *Politik, Staatskunst*; Fr. *politique*, or *science politique*; Ital. *politica*. (1) Political affairs.

(2) The science of the STATE (q.v., also philosophy of).

The science of politics is one of the MORAL SCIENCES (q.v.), inasmuch as the phenomena which it investigates have their origin in the human will. Inasmuch as it is concerned not with the individual, but with collections of individuals, it is one of the social sciences. As there is a general science of society (known as sociology), political science is one of the special SOCIAL SCIENCES (q.v.). The relation of political science to political economy has been differently conceived at different times. Political economy owes its name to the fact that economic phenomena were first studied in order to discover the means of increasing the resources of the state. A trace of this original aim is preserved in the title of Adam Smith's *Wealth of Nations*. If political economy were confined to tracing the laws which determine the resources of the state, it would clearly be a branch of political science. But modern political economy concerns itself as well with the laws which govern individual wellbeing. (F.C.M.)

Poly- [Gr. πολύ, many, much]: Ger. *poly-, viel-*; Fr. *poly-*; Ital. *poli-*. Many, multiple; as polyopia, multiplication of images in vision (occurs in hysteria). (J.J.)

Polylemma: a DILEMMA (q.v.) with a considerable number of excluded hypotheses.

Polysyllogism: a system of syllogisms.

Polysyllogistic proof: a proof consisting of a system of syllogisms. (C.S.P.)

Polygraph: see LABORATORY AND APPARATUS, II (general).

Polylemma: see POLY-.

Polyphyletic: see CONVERGENCE.

Polysyllogism: see POLY-.

Polysyllogistic Proof: see POLY-.

Polytheism: see THEISM.

Polytypic (or **Divergent**) **Evolution:** see EVOLUTION, ISOLATION, and PHYSIOLOGICAL SELECTION; and cf. ORGANIC SELECTION.

Pomponatius, Petrus, called **Peretto.** (1462–1524.) He studied medicine as well as philosophy at Padua. Became a teacher first in Padua, then in Ferrara, and finally in Bologna, where he died. The most distinguished Aristotelian scholar of the Renaissance.

Pons asinorum (in logic) [Lat.]. A diagram, attributed to Petrus Tartaretus (about 1480), used to illustrate the relations of the middle term. Cf. MOOD (in logic). The figure is given in Eisler, *Wörterb. d. philos. Begriffe*, 'Eselsbrücke.' (J.M.B.)

Poor Law: Ger. *Armengesetzgebung*; Fr. *système d'assistance publique*; Ital. *legge di assistenza pubblica*. A statute governing the administration of public charity; specifically, the English Poor Law of 1782 (Gilbert's Act), which had an unfortunate effect in promoting mendicancy, and the Act of 1834, by whose workings many of these evils were lightened.

The history of poor relief in England falls into four periods. (1) Down to 1600 the state confined its efforts to the suppression of unnecessary pauperism, leaving the care of the incapable to other agencies. (2) From 1600 to about 1750 the parish authorities were charged with the duty of administering poor-relief, but with strict precautions against abuse. (3) From 1750 to 1833, a period of liberal relief and lax administration. (4) Since 1834, a time of return to stricter tests. Poor-relief in America has been so far a matter of local practice, that it has had no organized or systematic history like that of England. (A.T.H.)

Pope [Lat. *papa*, father]: Ger. *Papst*; Fr. *Pape*; Ital. *Papa*. The title borne, since Gregory VII, exclusively by the bishop of Rome, signifying his primacy and jurisdiction as sole and infallible head of the Roman Catholic Church.

The title was originally given to all Christian teachers, but in time became limited to the primates of Rome, Alexandria, Antioch, Jerusalem, and Constantinople. It was first formally assumed as the exclusive title of the Roman bishop by Siricius (384–98), which use was confirmed by a decree of Gregory VII. The Pope is the supreme teacher, priest, and administrator of the Church. In 1870 the Vatican Council pronounced him infallible when speaking *ex cathedra* in matters of doctrine and morals. See INFALLIBILITY.

Literature: C. B. F. ALLNATT, Cathedra Petri (London, 1883); SCHROEDL, Gesch. d. Päpste, &c. (1888); MILMAN, Latin Christianity; Smith and Cheatham's Dict. of Christ. Antiq., art. Pope. Cf. J. B. MULLINGER, in Encyc. Brit. (9th ed.), art. Popedom. (A.T.O.)

Population [Lat. *populare*, to people]: Ger. *Bevölkerung*; Fr. *population*; Ital. *popolazione*. The number of inhabitants dwelling in a given territory at a specified time. If the population of any territory is divided by

the number of units of territorial area (e. g. square miles), the quotient gives the density of population.

Increase of population was regarded as a public good by practically all writers down to the close of the last century. It was reserved for Malthus to show that under conditions of production which may often exist, increase of numbers might result in making the average standard of life lower, and thus be an evil instead of a good. Cf. MALTHUS' LAW.

Some writers (e. g. Nitti) have attempted to show that prosperity tends to check the increase of population; but as all their observations can be equally well accounted for on the hypothesis that increase of population tends to check prosperity, their work can hardly be considered as vitiating the most important of Malthus' generalizations. (A.T.H.)

Porphyry. (233–cir. 303 A.D.) Educated under Origen at Caesarea, Longinus at Athens, and Plotinus at Rome, he became a passionate disciple of the latter. Travelled in Sicily and elsewhere, returning to Rome to live. He was a voluminous writer, but most of his writings are lost. See ALEXANDRIAN SCHOOL.

Port Royal Logic. The name usually given to a treatise entitled *La logique, ou l'art de penser*, published in 1662. It appeared anonymously, but was written by the Port Royalists Antoine Arnauld (called the great Arnauld) and Pierre Nicole.

The former, a man of considerable power, thought and sketched the book, which his collaborator worked up. Being the first Cartesian logic, a book marked, too, by good sense and literary charm, and not without some scientific merit (though it is weak on the inductive side), it became immensely popular, and did a great deal to spread the doctrine of Descartes. It is chiefly celebrated for the prominence it gives to the anti-Aristotelian theory of logical extension and comprehension; although this doctrine does not begin here to take the position it occupied in the Kantian treatises.

It has been translated several times into English, the best version being that of Thomas Spencer Baynes. (C.S.P.)

Port Royalists. A body of ascetic scholars who settled in the deserted monastery of Port Royal and became leaders in the Jansenist movement. See JANSENISM, and PORT ROYAL LOGIC.

The Port Royalists numbered some of the most distinguished scholars of the time. In philosophy they were influenced by Descartes. They were the leaders in the Jansenite attack on the Jesuits.

Literature: see references under JANSENISM. (A.T.O.)

Porter, Noah. (1811–92.) Educated at Yale College. He was master of the Hopkins Grammar School, New Haven, 1831–3; tutor at Yale, 1833–5; studied theology also, 1833–5; pastor at New Milford, Conn., 1836; located at Springfield, Mass., 1843; Clark professor of metaphysics and moral philosophy at Yale College, 1846; studied German philosophy (chiefly) for one year in Europe, 1853–4; president of Yale College, 1871; resigned, 1885; remained Clark professor until his death.

Posit [Lat. *ponere*, to put, place, lay down]: Ger. *Setzen, gesetzt* (posited), *Position* (a positing); Fr. *poser, affirmer*; Ital. *porre, affermare*. To affirm immediately, that is, not as a result of inference; to assert as given fact; to present as unquestioned existence, not depending on any prior process. Cf. IMMEDIACY (psychical, and logical).

The term had originally, in the main, a logical significance, meaning any premise so far as asserted without reference either to previous argument or to the concessions of a real or supposed opponent. In the post-Kantian movement, however, the term assumed a more metaphysical meaning, in harmony with the general tendency to give an objective rendering to the logical, or to hold that thought has a material and not merely a formal bearing. This tendency is most marked in Fichte. In following the effort, initiated by Descartes, to get something beyond all doubt, absolutely certain in itself, and hence a first principle in itself, he started from assertion as the principle of all judgment, and found as a condition of all judgment whatever, the ultimate and irreducible self-assertion of the Ego—its self-positing. 'The Ego posits originally and simply its own being' (*Werke*, i. 98; see Adamson, *Fichte*, 153–63; Everett, *Fichte's Science of Knowledge*, 71). This act is at the same time a fact; the self-activity of the Ego is its existence. Further metaphysic consists in developing the system of positings implied in and derived from this original positing. Positing is, so to speak, the fundamental category—that in which the logical and ontological are one, in which thought (the activity of Ego) gets objective value.

Hegel, on the contrary, in accordance

with his uniform tendency to do away with the merely or purely immediate, reduces 'positing' to a lower level. It is the UNDERSTANDING (q. v.) which posits; that is to say, positing is dogmatic, unquestioned assertion, which, however valuable and necessary for practical purposes (to get a firm and definite basis from which to proceed), is really a process of reflection. Thus it turns out to be really a supposition involving a presupposition (Voraussetzen). The search for this presupposition is therefore the real 'positing,' since it alone determines what the true being is (Hegel, *Werke*, iv. chap. i). Or, put more simply, it is only as a working datum—a starting-point—that we find anything prior to reflection, and thus can distinguish that which is immediately given from that which is thought. The process of reflection, while apparently merely about the given reality, in the end always decides for us what that reality is, so that the original 'fact' is displaced or transformed, instead of remaining as it was plus a number of new traits externally added to it by reflection. Thus the genuine process of positing is one of determining or defining through the whole system of thought. Cf. HEGEL'S TERMINOLOGY, V, f.

In English the terms posit and pose are rarely used, save to translate the German Setzen; since, however, we use the terms suppose and presuppose freely and in non-technical ways, it is a matter of regret that we have not, like the Greek (thesis and hypothesis) and the German (Setzung, Voraussetzung, Position), the correlates pose and position. (J.D.)

Position (consciousness of bodily): Ger. *Lage-empfindung*; Fr. *sensation de la position (du corps)*; Ital. *percezione di posizione (del corpo)*. The normal perception of bodily position is a complex of visual and tactual (skin, joint, muscle, tendon) factors. The most important of these are probably vision and articular sensation.

The point of reference for orientation is, in most cases, the head (eyes, eye-muscles, neck-muscles). In so far as the perception of position involves sensations of equilibrium or of change of position (progressive rectilineal movement or progressive rotation), the organ of the STATIC SENSE (q.v.) is probably concerned in it. See EQUILIBRIUM (sensation of), and ILLUSIONS OF MOTION. (E.B.T.)

Literature: WUNDT, Physiol. Psychol. (4th ed.), ii. 23 ff.; SANFORD, Course in Exper. Psychol., expts. 45, 46; BLOCH, C. R. de la Soc. de Biol. (1896), 81; FÉRÉ, ibid. 61; H. BEAUNIS, Sensations internes; MORSELLI, Semej. mal. ment., i. (E.B.T.–L.M.)

Positive [Lat. *positum*, from *ponere*, to place]: Ger. *positiv*; Fr. *positif*; Ital. *positivo*. (1) Logical: as applied to judgments, affirmative or asserting, opposed to negative or denying. Applied to terms, referring to a quality which is inherent, while a negative term connotes absence or limitation.

(2) Social and practical: that which depends upon will or convention instead of upon the forces of nature irrespective of human intervention; e. g. positive law, rights, religion, morality, &c. It is opposed to NATURAL (q. v.).

(3) Philosophical: that which depends upon observation of phenomena, or facts in space and time, not upon a thought process: the scientifically verifiable. Opposed to the speculative. See POSITIVISM. According to Comte, mankind passes through the theological and metaphysical stages in arriving finally at the positive. (J.D.)

Positive attribute: an experientially definite attribute, or one which for some other reason appears more definite than its contrary.

Positive denial: an explicit denial, opposed to one which is virtually made by an omission to affirm.

Positive discrepancy: a disagreement between statements consisting in the one asserting what the other positively denies.

Positive distinction: a real distinction between two positively experimental objects, and not merely between an experience and the failure of it. There is a positive distinction between the odours of the rose and the orange-flower; a merely negative one between the perfume of the tea-rose and the want of perfume of the ordinary climber.

Positive idea: an idea due to a positive experience. Locke says: 'Concerning the simple *ideas* of sensation, it is to be considered that whatsoever is so constituted in nature as to be able, by affecting our senses, to cause any perception in the mind, doth thereby produce in the understanding a simple *idea*; which, whatever be the external cause of it, when it comes to be taken notice of by our discerning faculty, it is by the mind looked on and considered there to be a real *positive idea* in the understanding, as much as any other whatsoever: though perhaps the cause of it be but a privation in the subject' (*Essay concerning Human Understanding*, II. viii. 1).

Positive Law (q. v.): a law laid down, a statute. 'I would not here be mistaken, as if, because I deny an innate law, I thought there were none but positive laws' (Locke, *Essay concerning Human Understanding*, I. iii. 13).

Positive philosophy (see Positivism, also (3) above): the system of philosophy of Auguste Comte; so called by him as composed of definite experiential results of science.

Positive proof or *evidence*: proof or evidence of a definite experience of the fact concluded. Positive proof is not necessarily more certain than negative proof. Thus, if a man comes home from business and finds all the portable valuables and his wife's best clothes gone, the wife having herself disappeared, this negative evidence that she took them is stronger than if a witness of suspicious character were to testify that she did so. Nor is positive proof or evidence the same as direct proof or evidence, as Kant and other writers say; for the fact that a man was in the utmost distress for want of money just after the robbery of a bank would be positive, yet indirect, evidence that he did not commit the robbery.

Positive proposition, judgment, or *enunciation*: a proposition more experientially definite in its assertion than its negative. An affirmative proposition is one which has the grammatical form of a positive proposition. But the present definition can only be regarded as tentative, since there has been no thorough investigation of the logical nature of the positiveness of propositions.

Positive whole: a whole made up of parts, in contradistinction to a whole indivisible even in thought, such as a person. (C.S.P.)

Positive Law [Lat. *positivus*]: Ger. *positives Recht, Satzungsrecht*; Fr. *droit positif*; Ital. *diritto positivo.* Law imposed and enforceable in any community by the sovereign political authority. See Holland, *Jurisprudence,* chap. iv. It is therefore a different thing from natural law, though it may in a particular case reaffirm a rule of natural law, and supply a sanction. Cf. Positive.

If it contravenes fundamental principles of natural law, there are authorities of weight which declare it to be void, under a system of free, constitutional government. See Loan Association *v.* Topeka, 20 Wallace's United States Law Reports, 655.

Literature: Wolff, Inst. of the Law of Nature and Nations, i. chap. ii. 39; Montesquieu, Esprit des Lois, Liv. I. chap. iii. (S.E.B.)

Positive Theology: Ger. *positive Theologie*; Fr. *théologie positive*; Ital. *teologia positiva.* The system of doctrine which arises from the application of positive categories to the Divine nature; to be distinguished from negative theology, in which the divine nature is symbolized under negative categories.

The distinction between negative and positive theology is of Neo-Platonic origin, and was introduced into Christian thought in the 5th century by the Pseudo-Dionysius, whose work on mystical theology is the classic on this theme. In his representation, God in his essential nature wholly transcends human conceptions, and can be only negatively conceived. The sum of these negative conceptions constitutes negative theology, and is higher than positive theology, which occupies a purely relative place, and arises out of the application of inadequate categories to the divine nature.

Literature: works of Dionysius; Migne, Patrology; McClintock and Strong, Cyclopedia of Bibl. Knowledge, Pt. IV. (A.T.O.)

Positivism: Ger. *Positivismus*; Fr. *positivisme*; Ital. *positivismo.* (1) The assertion of what is instituted in any sphere, as distinct from what is natural; revealed religion, for example. This use is rare.

(2) Dogmatism (q. v.); assurance in holding or asserting philosophic tenets; the antithesis to scepticism, nihilism, negativism. This is also rare.

(3) The name applied by Comte to his own philosophy, and characterizing, negatively, its freedom from all speculative elements; and, affirmatively, its basis in the methods and results of the hierarchy of positive sciences; i.e. mathematics, astronomy, physics, chemistry, biology, and sociology. It is allied to Agnosticism (q. v., also Unknowable) in its denial of the possibility of knowledge of reality in itself, whether of mind, matter, force; it is allied to Phenomenalism (q. v.) in its denial of capacity to know either efficient or final causation, or anything except the relations of coexistence and sequence in which sensible phenomena present themselves. It differs, however, in insisting upon (*a*) the possibility and necessity of a relative synthesis or organization of the data of all the sciences; (*b*) the value of science for prevision and practical control; and (*c*) its availability, when thus organized and applied, for moral guidance and spiritual support and consolation. See Religion of Humanity.

(4) The term is used more loosely to denote

any philosophy which agrees with that of Comte in limiting philosophy to the data and methods of the natural sciences—opposition to the *a priori*, and to speculation by any method peculiar to metaphysics. In this sense Locke and Hume were positivists: Hume, indeed, quite explicitly so in limiting the method of philosophizing to the results of observation, and stopping whenever going further means confused and uncertain speculation about hypothetical causes (*Treat.*, i. § 4). Mill and Spencer are called positivists, though thoroughly opposed to Comte in many respects. George Eliot is a positivist in a somewhat more strictly Comtian sense. Cf. NATURALISM. (J.D.)

Literature: COMTE, Positive Philos.; Positive Polity (synopsized in English by Harriet Martineau and George Henry Lewes); J. S. MILL, Auguste Comte and Positivism; SPENCER, Genesis of Science; Classification of the Sciences; HUXLEY, Scientific Aspects of Positivism; FISKE, Outlines of Cosmic Philos.; E. CAIRD, Social Philos. of Comte; Encyc. Brit., art. on Comte; LAAS, Idealismus und Positivismus (1879–84); H. GRUBER, A. Comte (1889). On Comte's Social Philosophy see BARTH, Geschichtsphilos. als Soziol., i.

(J.D.–K.G.–J.M.B.)

Possession [Lat. *possessio*]. One of the categories of Aristotle (*ἔχειν*, *haben*). See CATEGORY. (J.M.B.)

Possession (demon, &c.): Ger. *Besessenheit*; Fr. (*délire de*) *possession*; Ital. *possessione, indemoniamento*. The notion that a disease, such as epilepsy, is due to the possession of the patient by an evil spirit. Cf. DEMONOMANIA, and OBSESSION. (J.J.)

Possibility, Impossibility, and **Possible** [Lat. *possibile*, from *posse*, may, can, be able; equivalent to the Gr. *δυνατόν*]: Ger. *Möglichkeit, Unmöglichkeit, möglich*; Fr. *possibilité, impossibilité, possible*; Ital. *possibilità, impossibilità, possibile*. The term is used to express a variety of meanings which, although distinct in themselves, yet flow readily into one another. These meanings may best be grouped according as they have (1) an ontological objective value, or a logical subjective value; and (2) according as they are used antithetically to actuality or necessity. The antithetical point of view is the most convenient from which to begin.

Possibility may mean that something is (1) not actual, or (2) that, while it possesses actual existence, that existence lacks causal or rational necessity.

(1) As opposed to the actual, the phrase has again a double meaning. (*a*) Taken objectively, it may mean something as yet undeveloped, since not presenting itself in actually objectified form, but capable of doing so at some future time, when all the conditions of its realization occur: latent, potential being. This implies capacity for realization; and, if this capacity be taken in an active sense, connotes some inherent tendency to actuality, which if not thwarted leads to final completeness of being. This involves the active sense of POTENTIALITY (q. v.), of FORCE (q. v.), &c. It is close to the literal sense of the term (posse, *can* be). This is the dominating sense in Greek philosophy, being connected with Aristotle's teleological theory of development. See NATURE, and POWER (*δύναμις* and *ἐντελέχεια*). (*b*) Taken logically, it denotes that there is some ground for asserting actuality, but not sufficient to justify a positive statement: *may*, as distinct from *can*, be. Thus, possibly it will rain to-morrow. It has to do with degrees of certainty in judging. See PROBABILITY.

(2) As opposed to the necessary, the term has also a double sense. (*a*) It may mean chance, contingency, as an objective fact. CHANCE (q. v.), again, has a double meaning: (i) something not derivable or explainable causally by reference to antecedent facts. There are those who assert the reality of such chance (see TYCHISM). On this view there are many *possibilities* in store in the future which no amount of knowledge would enable us to foresee or forestall. Indeterministic theories of the will assert possibilities of this sort also. (ii) Chance may mean that which, while necessary causally, is not necessary teleologically: the unplanned, the fatalistic. From this point of view the 'possible' is that which unexpectedly prevents the carrying-out of a purpose or intention. It leads up to the logical sense (*b*), according to which the possible, as opposed to the necessary, is anything whose existence cannot be derived from reason: that, the existence of which, rationally speaking, might be otherwise. It is opposed to mathematical or metaphysical necessity, where existence cannot be otherwise than as it is. In this sense the objective actual may be only (logically) possible: the present rain-storm is actual, but since it does not follow from a necessity of thought, but only from empirical antecedents, it is not necessary, and hence just a contingent possibility. This distinction goes back also to Aristotle,

being found in his logical writings, as the possible, as potential meaning, is found in his metaphysical. It has played a large part in modern RATIONALISM (q. v.), especially in the philosophy of Leibnitz, being identical with his distinction of 'truths of reason' and 'truths of fact.' In the sphere of mathematics, logic, and metaphysics there is no possibility in the strict sense; all that exists exists of necessity. In the physical and practical spheres which deal with the space and time world the notion of possibility has full sway. Everything is possible which does not contradict the laws of reason; that which is inconceivable, which violates the law of reason, is impossible. The impossible is the self-contradictory. Kant's criticism of rational conceivability as a criterion of truth, to the effect that it is only formal, resting upon the principle of identity and contradiction, and when applied to existence must be supplemented by appeal to sense, made Leibnitz's distinctions of hardly more than historic interest.

The problems regarding the possible as a category of philosophy may be summed up as follows: Does it have any objective existence, or is it simply an expression of a certain logical attitude? If the former, is the objective possibility a necessary phase of a process of development, which will unfold itself into actuality; or does it express a particular fact, the reality of chance? If of logical significance only, does it flow from the distinction between *a priori* reason and *a posteriori* experience; or does it express a certain combination of ignorance and assurance in relation to facts, so that *real* possibilities would also be experienced facts? (J.D.)

The nominalistic definition (nominalistic in its real character, though generally admitted by realists, as Scotus, i. dist. 7, qu. unica) that that is possible which is not known not to be true in a real or assumed state of information is, like many nominalistic definitions, extremely helpful up to a certain point, while in the end proving itself quite superficial. It is not that certain things are possible because they are not known not to be true, but that they are not known not to be true because they are, more or less clearly, seen to be possible.

For example, one collection may be said to be greater than another if, and only if, there is no *possible* relation in which every member of the former collection stands to a member of the latter, to which no other member of the former stands in the same relation. Now, the question arises—whether or not it is possible for two collections to be, under this definition, each greater than the other. In advance of an investigation, the *proposition* is possibly true, in the sense that we do not know that it is impossible. But is the *fact* possible? That is, can we in any way suppose such a state of things without involving ourselves in contradiction? It is that positive supposition which will constitute the possibility, not the mere ignorance of whether such a supposition can be made or not. In order to make two such collections possible, we must make some positive assumption in regard to the possibility of collections; while in order to make such a relation between two collections impossible, we have to make a positive assumption of the possibility of a certain description of relation. It is not a question of ignorance, since nothing but pure hypothesis is concerned. The question is whether it is possible in every case to suppose distinct pairs each composed of a member of either collection and such as completely to exhaust one of the collections. If this is always possible, then two collections each greater than the other are impossible. It is evidently desirable to state the logical principles of this general kind of possibility, which does not consist in ignorance, but, as it would seem, in hypothetic indetermination or disjunctive determination.

Nominalists uniformly speak of Aristotle's view of future contingents as really absurd. It may be so; but it is certainly the only doctrine which their principles leave room for. A certain event either will happen or it will not. There is nothing now in existence to constitute the truth of its being about to happen, or of its being about not to happen, unless it be certain circumstances to which only a law or uniformity can lend efficacy. But that law or uniformity, the nominalists say, has no real being; it is only a mental representation. If so, neither the being about to happen nor the being about not to happen has any reality at present; and the most that we can say is that the disjunction is true, but neither of the alternatives. If, however, we admit that the law has a real being, not of the mode of being of an individual, but even more real, then the future necessary consequent of a present state of things is as real and true as that present state of things itself.

By the old logicians, possibility is usually

defined as non-repugnancy to existence. Kant defines it as that which satisfies the formal conditions of experience (*Krit. d. reinen Vernunft*, 1st ed., 218, 234).

The possible proposition, or problematic judgment, as it is called by German logicians, is said by many logicians, especially Sigwart, not to be any proposition at all, because it does not draw a sharp line between truth and falsity. It seems to be necessary to distinguish between a proposition which asserts that under such and such general conditions a certain thing is possible, of which an example is the proposition that of any two collections one is not greater than the other, and a proposition which pretends to be no more than a conjecture. If a conjecture can be absolutely baseless, which may be doubted, a proposition which pretended to be no more than that may be said to be no proposition at all. But it can hardly be maintained that when Poincaré says that there is no physical law whatever which will not be rendered more certain by every new confirmatory experiment, he is depriving those laws of all meaning as propositions.

Logical possibility: that of a hypothesis not involving any self-contradiction.

Mere possibility: that of a state of things which might come to pass, but, in point of fact, never will. In common language, exaggerated to the 'merest possibility.'

Metaphysical possibility ought to mean a possibility of existence, nearly a potentiality; but the phrase does not seem to be used in that sense, but rather in the sense of possibility by supernatural power.

Moral possibility one might expect should be the opposite of moral impossibility, meaning, therefore, something reasonably free from extreme improbability. But, in fact, it seems to be used to mean what is morally permissible.

Physical possibility: (1) that which a knowledge of the laws of nature would not enable a person to be sure was not true; (2) that which might be brought about if psychological and spiritual conditions did not prevent, such as the Pope's pronouncing *ex cathedra* as an article of faith the fallibility of all his own utterances.

Practical possibility: that which lies within the power of a person or combination of persons under external conditions likely to be fulfilled, and questionable chiefly because internal conditions may not be fulfilled.

Proximate possibility. It is very difficult to make out what is meant by this; but the phrase is evidently modelled on *potentia proxima*, which is a state of high preparedness for existence; so that proximate possibility would be a high grade of possibility in a proposition amounting almost to positive assertion.

Real possibility is possibility in the thing, as contradistinguished from mere logical possibility (Scotus, *Opus Oxon.*, I. ii. 7, *Ad secundam probationem maioris*).

Remote possibility: the possibility of a proposition which is far from being positively asserted. Also used in common speech.

Substantive possibility: the admissibility of a pure hypothesis (as illustrated above). (C.S.P.)

Post hoc, ergo propter hoc [Lat.]: see FALLACY.

Postpredicament [Lat. *postpraedicamentum*]: Ger. *Postprädicament*; Fr. *postprédicament*; Ital. *categorie postume*. One of five relations which are considered by Aristotle in the book of *Praedicamenta*, or *Categories*, after he has disposed of the predicaments themselves. They are *opposita* (*ἀντικείμενα*, in cap. x, xi) of four kinds (see OPPOSITION, in logic), *prius* (*πρότερον*, in cap. xii) of five kinds (see PRIOR), *simul* (*ἅμα*, in cap. xiii) of two kinds, *motus* (*κίνησις*, in cap. xiv) of six kinds, and *habere* (*ἔχειν*, in cap. xv) of eight kinds (see POSSESSION).

Abelard gave a special meaning to this word (for which see Prantl, *Gesch. d. Logik*, ii. 169), and also added Antepredicament. (C.S.P.)

Post-selection [Lat. *post* + *selectus*, chosen]: foreign equivalents are not in use. Natural selection of a structure, function, habit, or instinct, effected at a period in the life-history of the individual subsequent to the period when the character selected appears or takes place.

Suggested by Minot. A structure appears in an embryo; but, not benefiting the embryo, selection cannot act until a later stage, in which further development has rendered the structure useful. A parasitic wasp lays an egg in a larva, but without benefit to herself; but the benefit by which selection acts appears in the life of the offspring. These illustrations make the term clearer. Most natural selection is post-selection.

Literature: MINOT, Biol. Centralbl., xv. (1895) 584 (trans. in Amer. Natural., 1895); CH. DARWIN, Origin of Species (1859). (C.S.M.)

Postulate [Lat. *postulatum*, begged, used to translate Gr. *αἴτημα*]: Ger. *Voraussetzung* (the German *Postulat* = *Forderung* is a very different idea from that properly expressed by

the French and English words); Fr. *postulat*; Ital. *postulato*. (1) The earliest definition we have of postulate, which was a technical term of Greek geometers, is by Aristotle. The passage has an appearance of incoherence; it is, however, plain that Aristotle makes a distinction between *hypotheses* and *postulates* which Euclid does not draw, and which is irrelevant. Omitting the distinction, the two have this in common—that they are propositions not necessarily true which are assumed as the bases of deductions.

If we turn to the first book of Euclid's *Elements*, we observe, in the first place, that he calls axioms by the name of common notions, a deliberate choice by him, for Aristotle, before his day, had called them axioms, though Aristotle usually calls them τὰ κοινά, nearly Euclid's name. These matters of common knowledge, according to Euclid's enumeration of them, are not specially geometrical, except that magnitudes superposable are equal (see the *Cent. Dict.*, 'Axiom'). On the other hand, the 'postulates' of Euclid are all geometrical. They are as follows (according to the best MS. and all the evidence):—

(*a*) Between any two points a straight line can be drawn.

(*b*) Any terminated straight line can be prolonged at either end indefinitely.

(*c*) About any point in any plane as centre a circle may be described with any radius.

(*d*) All right angles are equal.

(*e*) If two straight lines in a plane are cut by a third, making the sum of the internal angles on one side less than two right angles, those two straight lines will meet if sufficiently produced.

(*f*) Two straight lines cannot enclose a space in a plane.

(2) Since Wolff it has been very common among Germans, and among English writers who follow them, to define a postulate as an indemonstrable practical proposition. That is to say, it is an indemonstrable *particular* proposition, asserting that some general description of an object *exists* (in the only sense in which pure geometrical forms can be said to exist), in contradistinction to *axioms*, which were supposed to be indemonstrable theoretical (i. e. universal) propositions, asserting that some general description of an object has no existence as a geometrical form.

It is certainly desirable to have two terms bearing these meanings; but it was an utter misunderstanding to suppose that such were the proper meanings either of the word *axiom* or of the word *postulate*. The manner in which this misunderstanding came about is somewhat instructive. An axiom was a perfectly indubitable statement *about things*, in contradistinction to a definition, which cannot be called in question. On the contrary, a postulate was an indemonstrable proposition, not indubitable. There was some question whether certain postulates might not be considered to be axiomatic. When that was done, all the remaining postulates were particular propositions; namely, the first three of Euclid's list. This view was aided by the illogical notion that definitions could be considered as among the foundations of geometrical truth. Some writers went so far as to say that definitions were, or ought to be, the sole foundation of geometry—an extreme nominalistic position. But if definitions are allowed to take such a position, one postulate, at most, suffices, without any axiom; and all the rest of geometry can be thrown into a single definition. Namely, it is only necessary to postulate, say, that a point is possible, and to define a point in such a way as to make it cover the whole of geometry. This was not seen; and the practice of throwing geometrical truth over into definitions so far prevailed as to aid in restricting postulates to particular propositions. That such assumptions of possibility had a markedly different logical function from assumptions of impossibility was sufficiently clear to Wolff and the earlier writers whom he followed to cause him to put forth his definitions of *axiom* and *postulate*; and they recommended themselves all the more, because the postulates had become so familiar that it was no longer recognized that they were open to doubt.

(3) Kant calls his principles of modality 'postulates of empirical thought' in the sense of judgments which are objectively analytical but subjectively synthetical. In fact, the principles as stated by him are not synthetical in any sense whatever, but are mere definitions. (C.S.P.)

Potency: see POTENTIALITY, and POWER.

Potential [Lat. *potens*, capable]: Ger. *potentiell*; Fr. *potentiel*; Ital. *potenziale*. The POTENTIALITY (q.v.) of a thing is said to be potential or to exist potentially. (J.M.B.)

Potential (in physics): Ger. *Potential*, *Potentialfunktion*; Fr. *potentiel*; Ital. *potenziale*. A mathematical quantity or function whose value throughout any region of space in which given forces of attraction and repul-

sion act is determined by the condition that its difference of value between any two points is equal to the work done or energy gained by a unit particle in passing from one point to the other.

Potential energy: energy of position; a mathematical quantity expressing a condition, state, or relation of a system of bodies, such that energy may be generated by a change of that condition, state, or relation alone. See ENERGY. (S.N.)

Potentiality (1) and (2) **Potency** [Lat. *potens*, capable]: Ger. (1) *Potentialität*, (2) *Potenz*; Fr. (1) *potentialité, virtualité*, (2) *puissance*; Ital. (1) *virtualità*, (2) *potenza*. (1) That which a thing is judged capable of becoming or doing before it becomes or does it; that part of the entire meaning of a thing which is still prospective.

(2) Potency is used in two senses: (*a*) a concrete potentiality, i.e. towards a particular sort of becoming or doing, and (*b*) as equivalent to positive causal agency or power, especially in the adjective form 'potent.' See POWER.

The very obscure concept called potentiality has been used by almost every conceivable shade of thought as the repository of that which is unexplained. Aristotle started the pursuit of this notion and used it in a way which shed much light upon the questions of philosophy concerned with change and organization. Cf. GREEK TERMINOLOGY (6). With all the metaphysics of causation which the history of philosophy shows, there has been little effort to trace the psychological meaning of this category. How common it is to hear the expression, 'this thing exists, not actually, but potentially,' given as the end of debate, and accepted, too, as the end; yet the history of the subject would be mainly an exposition of a section of Aristotle's metaphysics with the refinements on Aristotle due to the logic of the schoolmen and the dogmatic of modern theology. It may suffice to say something of the natural history of the distinction between potential and real existence.

There are two aspects, under one of which reality must in all cases be viewed—the prospective and the retrospective. Cf. ORIGIN *versus* NATURE. The retrospective aspect sums up the history, which gives positive content to the notion of a thing considered as having an accomplished career. This aspect, it seems clear, is what is in view when we speak of real existence in contrast with potential existence. It is not indeed adequately rendered by the content supplied by retrospect, since the fact that the two predicates are held in mind together as both together applicable to any concrete developing thing, forbids us to construe real existence altogether apart from the fact that it has a further issue in further career. It is a great merit of Aristotle that he forbade just this attempt to consider the δύναμις apart from the ἐνεργεία. But, nevertheless, it is true psychologically that real existence is exhausted as a content-predicate with the backward aspect of the series of changes which give content to reality.

And it seems equally evident that potential existence is concerned with the 'prospective' reference of the thought of things. That this is so is perhaps the one element in the notion of potentiality that all who use the word would agree upon. But this is inadequate as a description of the category of potentiality. For if that were all, how would it differ from any other thought of the prospective? We may think of the future career of a thing simple in terms of time; that, we should probably agree, does not involve potentiality. A particular potency is confined to a particular thing, i. e. to a particular series of events making up a more or less isolated career. If only the bare fact of futurity were involved, why should not any new unrolling of career be the potency of anything indiscriminately?

This leads us to see that potentiality, even when used in the abstract, is never free from its concrete reference. And this concrete reference is not that of conception in general, only or mainly; the concrete reference of conception generally is a matter of 'retrospect,' i. e. of the application of the concept to individual things, so far as such application has been justified by historical instances. Indeed, it is the very occurrence of the historical instances which has given rise to the concept, and it generalizes them.

So when we put ourselves at the point of view of the concrete, we have to ask what is actually meant by us when we say a thing exists potentially, over and above the mere meaning that the thing is to exist in the future. We have seen that one added element of meaning is that the thing which is to exist in the future is in some way tied down in its manifestations to something that already exists actually; it must be the potentiality of some one thing in order to be a potentiality at all. Now, how can this be?

Of course the ordinary answer is at once on

our lips: the answer that the bond between the thing that is and the thing that is to be is the bond of causation. The potentiality is the unexpressed causal efficacy of the thing that is. But when we come to ask what this means, we find that we are hiding behind one of the screens of common sense. The very fact of cause, whatever bond it may represent from an ontological point of view, is at least a fact of career. The effect is a further statement of the career of the thing called the cause. Now, to say that the potency of a thing is its unexpressed causal power, is only to say that the thing has not finished its career, and that is a part of the general notion of a thing. That fact alone does not in any way define the future career for us, except in the way of repetition of past career. We merely expect the thing to do what it has done before, not to become some new thing out of the old. In short, the category of causation is not adequate, since it construes all career retrospectively.

We have, therefore, two positions so far, saying (1) that every potency is the potency of a thing, and this means that it gets its content in some way from the historical series which that thing embodies; but (2) that it is something more than a restatement of any or all of the elements of the series thus embodied. Now, what else is there?

The remaining element in the category of potentiality involves, it seems, a very subtle movement of the mind along the same distinction of the prospective from the retrospective. Briefly, the potentiality which I ascribe to a thing is my general expectation of more career in reference to it, with the further expectation, based on the combined experiences of mine that the prospective does get a retrospective filling after it has happened, that the new career of the thing to which I ascribe the potency, although not yet unfolded, will likewise be capable of retrospective interpretation as further statement, although not a restatement, of the one series which now defines the thing. This is usually given content from analogous or imagined cases in which the career has been actually unfolded.

In short, there are three elements or phases of consciousness in this matter: first, let us say, the general prospective element, the expectation that something will happen; second, the causation or retrospective element, the expectation that when it has happened it will be a consistent part of the history of the thing; and third, the conscious setting back of my observation at the dividing line between these two points of view, and the contemplation of the thing under both of them—both as a present thing and as a thing for what it will be when the future becomes present. For example: I say that a tree expresses the potency or potentiality of the seed. This means three concrete things. I expect the seed to have a future; I expect the future to be a tree—that is, a thing whose descriptive series is continuous with that already descriptive of the seed and analogous to the development of other trees—and, finally, I now look upon the seed as embodying the whole tree series now artificially present in my thought. (J.M.B.)

Poverty [Lat. *paupertas*]: Ger. *Armuth*; Fr. *pauvreté*; Ital. *povertà*. Failure to command the economic NECESSARIES (q. v.) for oneself and one's family.

If such failure is occasional, the poverty is occasional also; if the failure is continuous, the poverty is habitual.

Estimates of the rates of money income corresponding to different degrees of poverty (like the very valuable ones of Charles Booth) refer so far to local and temporary conditions that they hardly have use as permanent standards.

Poverty as here defined represents inadequacy of income. The term may also be used to denote absence of capital. If a man has a large income and spends it all he may be rich in one sense and poor in another. Most of the hasty generalizations about impoverishment are due to a careless use of these two meanings interchangeably. (A.T.H.)

Power [Late Lat. *potere*, for *posse*, to be able]: Ger. *Macht*, *Kraft* (this usually corresponds to force), *Vermögen* (faculty), *Potenz*; Fr. *puissance*, *pouvoir*; Ital. *potenza*, *potere*. Possibility of effecting or experiencing change, when this possibility is regarded as inherent in the agent or thing which is to act or be acted upon. Or, from another standpoint, it is the ground of an anticipated action or effect. It is, therefore, like CAUSE (q. v.) and FORCE (q. v.), one of the conceptions which are employed to explain change and preserve unity in our experience. Cf. POTENTIALITY.

Historically, it has been customary to speak of (1) active and (2) passive power. The conception of active power grows out of the attempt to unify still further the first member of the cause-effect relation, that of passive power out of the attempt to unify further the

second member. In considering a cause, the question arises why it begins to act. In certain cases this is explained by some external ground. In others—especially in the case of acts of a person—the ground is placed within. The external factor is neglected or regarded as merely the 'occasion.' Then since we cannot conceive the act as originating from nothing, we further unify our experience by relating the act to a permanent state of the agent or thing. As contrasted with force, it refers to the state preceding the activity, whereas force is one of the conceptions used to explain the activity itself. It is also commonly applied to the mental life, and here passes over into the more definite concept of FACULTY (q.v.). By the conception of 'passive power' the attempt is made to explain why a specific effect, such as melting in the case of wax, is produced by the same cause, heat, which produces an opposite effect upon other substances. This ground, we conceive, must lie in the thing acted upon. It is therefore not inappropriately termed a power, since it is an intrinsic state which determines (in part) the effect. Power is opposed, on the one hand, to actual activity; on the other, to the certainty of non-activity. It is therefore a mediating concept, framed to bridge the gap between non-action and action. By it we seek to think reality in such a way as to give a basis for explaining change. As such it was employed by Aristotle, who regarded all reality (except pure form) as at the same time actuality or entelechy, in so far as it is a complete, actual thing, or stage in a process; and also potentiality, in so far as it is to become something else (*ἐν ἐντελεχείᾳ*, and *ἐν δυνάμει*). The Latin *potentia* in mediaeval usage emphasized especially the opposition to actuality. Locke uses 'power' in the sense of the definition given above; but Leibnitz, in constructing the conception of his monads or entelechies, finds power (puissance) an inadequate concept, and conceives them as 'forces,' giving a metaphysical employment to the physical concept of 'active force' (*vis activa*), which modern dynamics was utilizing. Hume saw the subjective character of the concept of power and its affiliation with the concepts of force and necessary connection, and denied that we have any such idea in the sense of an objective entity, although elsewhere defining it as 'the possibility or probability of any action, as discovered by experience.' Modern physics does not use the conception, preferring the concept of ENERGY (q.v.), while modern logic devotes itself rather to the concepts of cause and necessity. The reason for this is perhaps found in the fact that power is too psychological a term for the physicist, and does not indicate so clearly its relative or synthetic character as cause. It is appropriately applied to 'money,' which is an objective entity, but gets actual value only in reference to a purchase of goods, which is conceived as depending on some agent's choice.

Literature: SIGWART, Logic (Eng. trans., 1895), ii. 92 ff.; LOTZE, Met. (1887), ii. 17 ff.; Microcosmus (1888), i. 36 ff.; Kleine Schriften (1885), i. 154 ff.; ZELLER, Aristotle (1897), ii. 354 ff., 378 ff.; LOCKE, Essay, ii. chap. xxi; LEIBNITZ, Nouv. Ess., ii. 21; and De Primae Philos. Emend.; WOLFF, Ontologia, §§ 716 ff.; HUME, Treatise, i. 3. 14, ii. 1. 10; REID, Active Powers, Essay I; HAMILTON, Met., x. (J.H.T.)

Power (consciousness of) [Lat. *potens*, able, through Fr.]: Ger. *Kraftbewusstsein*; Fr. *sens de pouvoir*; Ital. *coscienza di potere*. The awareness that the occurrence or non-occurrence of an event depends, or seems to depend, on our mental activity, either directly or mediately through bodily activity.

Consciousness of power has often been regarded by psychologists as a primary source, or the sole source, of the concept of efficiency which is essential to the causal relation. This psychological doctrine may be combined with a denial that the concept of 'efficiency' thus acquired can stand the test of epistemological criticism. But in general, those who lay stress on subjective consciousness of power as the original experience from which the concept is derived also find in this experience the justification of its validity. It is important to note that the derivation of the concept of 'efficient causation' from the 'sense of power' is only a special form of the theory which derives it from subjective activity. It may be held that its ultimate source lies in the experience of subjective activity as such, whether this is or is not accompanied by consciousness of success or secure presumption of success. Striving or conation by its intrinsic nature tends to bring about a certain kind of result, the result sought or striven after. This holds good whether other circumstances do or do not permit actual attainment of the end. The striving *qua* striving does its part towards its own satisfaction, though other conditions may interfere with the result. This intrinsic connection between conation and satisfaction, between object sought and object

found, is often regarded as the ultimate of the concept of 'efficient cause' or of the 'causal nexus.' It must be admitted that from this point of view the term 'efficiency' is not well chosen. It is better to speak of 'activity' or 'agency.' But these words cover what is ordinarily meant by 'efficient causation.' See CAUSE AND EFFECT.

Great stress is laid by Groos (*Play of Man*, Eng. trans.) on consciousness of power as one of the conditions of the pleasure of play in animals and men. He constantly refers to 'joy in being a cause.' Animals and children show great delight in finding themselves able to produce impressive results. A monkey, for instance, will push over a chair again and again, rejoicing in the clatter that follows; and a child takes delight in throwing his spoon to the floor as often as the patient nurse is willing to pick it up. (G.F.S., J.M.B.)

Literature: power figures in the writings of the French realists LAROMIGUIÈRE, ROGER COLLARD, MAINE DE BIRAN, COUSIN, JANET, as in the Scottish philosophers REID, MCCOSH. Cf. also BERTRAND, Sens de l'Effort. See the literature of CAUSATION. (J.M.B.)

Powers (mental): see FACULTY.

Practical [Gr. *πρακτικός*, from *πράττειν*, to do]: Ger. *praktisch, Geistes-(wissenschaften*, &c.); Fr. *pratique, moral*; Ital. *pratico, morale*. Pertaining to the sphere of values, worths, or ideals in the widest sense. See WORTH.

It covers all that is not theoretically or cognitively determined, but which involves purpose, teleology, striving, achievement, appreciation, ideals. The practical sphere is that of the 'fortune morale,' of the moral sciences, of ethical and aesthetic values. Cf. PRACTICAL REASON, PRACTICAL JUDGMENT, PRACTICE, and PRAGMATISM.

In the other languages, as in English, the popular usage limits the word to affairs of action; and in philosophy it is often applied specifically to the ethical, as in Kant's *Kritik der praktischen Vernunft*. If this last usage be followed, it makes practical, moral, and ethical all synonymous, and deprives us of a word in the sense of the definition. The obvious difficulty in adopting the usage suggested, however, is in bringing aesthetic contemplation and judgment under the connotation of practical. Yet the ethical and aesthetic together embody ideal values, and this would seem to justify it. (J.M.B., G.F.S.)

Practical Judgment: Ger. *praktisches Urtheil*; Fr. *jugement pratique*; Ital. *giudizio pratico*. (1) JUDGMENT (q.v.) exercised on matters of will and action, e.g. judgment of fitness of means to ends. Cf. PRACTICAL, and PRAGMATIC.

(2) Judgment as to suitability, workability, fitness of any sort, as the practical judgment of the inventor, and the 'tact' of the social leader.

In this sense it is by practical judgment that one 'sizes up' a situation of any sort and arranges or rearranges its elements. It is broader than (1). The usage (2) is recommended. (J.M.B., G.F.S.)

(3) A function of PRACTICAL REASON (q.v.).

According to Kant, the question 'whether an action which is possible to us in the world of sense comes under the rule [of the practical reason] is a question to be decided by the practical judgment, by which what is said in the rule universally (*in abstracto*) is applied to an action *in concreto*.' The practical judgment cannot, like the theoretical, provide for the idea of reason a 'schema' of sensibility; it can, however, provide a law—'such a law as can be exhibited *in concreto* in objects of the senses.' This law Kant calls the moral 'type,' and it runs: 'Ask yourself whether, if the action you propose were to take place by a law of the system of nature of which you were yourself a part, you could regard it as possible by your own will.' We thus 'use the system of the world of sense as the type of a supersensible system of things' (*Krit. d. prakt. Vernunft*, ed. Rosenkranz, 190–4; Abbott's trans., 159–63). (J.S.)

Practical Reason: Ger. *praktische Vernunft*; Fr. *raison pratique*; Ital. *ragione pratica*. (1) The function of reason or thought in matters of voluntary decision; and since voluntary acts and attitudes exhaust the ethical, frequently limited to the latter. See REASON (2), and cf. PRACTICAL, and PRACTICAL JUDGMENT (1).

The term has all the obscurity of the word reason in its relation to cognition in general or to thought. The definition leaves open the question of principles of 'reason' implicit in the exercise of thought, whether themselves capable of genetic determination or not. (J.M.B.)

(2) Reason as the source of *a priori* principles of moral practice.

In its practical use, according to Kant, 'reason is concerned with the grounds of determination of the will. . . . For here reason can at least attain so far as to determine the will, and has always objective reality in so far as it is the volition only that is in question.' Kant makes the autonomy of the will, or its

determination by pure practical reason, the basis of his ethics: this he calls its freedom. 'The critique of practical reason generally is bound to prevent the empirically conditioned reason from claiming exclusively to furnish the ground of determination of the will' (*Critique of Practical Reason*, Introd.). (J.S.)

Practical Religion: Ger. *praktische Religion*; Fr. *religion pratique*; Ital. *religione pratica*. That department of PRACTICAL THEOLOGY (q. v.) which has for its aim the upbuilding of the religious life in the community and the individual. Practical religion embodies itself in practical activities and in writings adapted to the religious needs of the time. (A.T.O.)

Practical Theology: Ger. *praktische Theologie*; Fr. *théologie pratique*; Ital. *teologia pratica*. That department of theology which treats of the corporate life of the Church, in its functions of government, edification, and worship.

Since Schleiermacher, who raised this discipline to its true dignity, practical theology has held a place co-ordinate with the exegetical, historical, and systematical branches. Of the three modes in which organic Christian life expresses itself—creed, code, and cult—practical theology in the broad sense would embrace the two latter. It includes homiletics as one of its departments, though the latter term is sometimes used as its equivalent, covering the subject of catechetics, liturgics, and polity.

Literature: NITSCH, Prakt. Theol.; BICKERSTETH, Christian Student's Biblical Assistant. (A.T.O.)

Practice (or **Praxis**) (in ethics) [Gr. πρᾶξις]: Ger. *Praxis*; Fr. *pratique*; Ital. *condotta*, (*la*) *praxis*. Conduct, or moral activity, as distinguished from the strictly intellectual life.

Aristotle distinguishes practice (πρᾶξις) from (1) theory or science (ἐπιστήμη), and (2) production (τέχνη). Unlike the former, it implies the presence of irrational desire, and consists in the regulation of the latter by reason; unlike the latter, it is its own end, and produces nothing beyond itself, i. e. it is AUTOTELIC (q. v.). (J.S.)

Practice (in psychology): Ger. *Uebung*; Fr. *pratique*; Ital. *pratica*. (1) Any sort of activity considered as preparing for (see PREPARATION), habituating (see HABITUATION), or exercising in (see EXERCISE) the function or functions brought into play.

Practice applies to mind or body and covers the three special cases distinguished in the definition, for each of which foreign equivalents are given sub verbis.

(2) Used for repetition in general, together with its effects, in REACTION TIME (q. v.) experimentation. Cf. Wundt, *Physiol. Psychol.* (4th ed.), i. 356.

Literature: that of FATIGUE (e. g. HENRI, Année Psychol., iii), and of REACTION TIME (e. g. ANGELL and MOORE, Psychol. Rev., iii. 1896, 245; BUCCOLA, Legge del tempo, 1883, chap. vi). See also PLAY (especially the 'practice theory' as developed by GROOS, Play of Animals, Eng. trans.). (J.M.B., G.F.S.)

Practice Theory (of play): see PLAY.

Pragmatic (1) and (2) **Pragmatism** [Gr. πραγματικός, versed in affairs]: Ger. *pragmatisch, Pragmatismus*; Fr. *pragmatique, pragmatisme*; Ital. *prammatico, prammatismo*. (1) This term is applied by Kant to the species of hypothetical imperative which he otherwise denominates 'counsel of prudence,' and characterizes as 'assertorial,' those, namely, which prescribe the means necessary to the attainment of happiness, an end which we may postulate for all sentient beings (*Grundlegung z. Met. d. Sitten*, ed. Rosenkranz, 42; Eng. trans., Abbott, 34). (J.S.)

Pragmatic anthropology, according to Kant, is practical ethics.

Pragmatic horizon is the adaptation of our general knowledge to influencing our morals.

(2) The opinion that metaphysics is to be largely cleared up by the application of the following maxim for attaining clearness of apprehension: 'Consider what effects, that might conceivably have practical bearings, we conceive the object of our conception to have. Then, our conception of these effects is the whole of our conception of the object.' (C.S.P.)

The doctrine that the whole 'meaning' of a conception expresses itself in practical consequences, consequences either in the shape of conduct to be recommended, or in that of experiences to be expected, if the conception be true; which consequences would be different if it were untrue, and must be different from the consequences by which the meaning of other conceptions is in turn expressed. If a second conception should not appear to have other consequences, then it must really be only the first conception under a different name. In methodology it is certain that to trace and compare their respective consequences is an admirable way of establishing the differing meanings of different conceptions. (W.J.)

This maxim was first proposed by C. S. Peirce in the *Popular Science Monthly* for January, 1878 (xii. 287); and he explained how it was to be applied to the doctrine of reality. The writer was led to the maxim by reflection upon Kant's *Critic of the Pure Reason*. Substantially the same way of dealing with ontology seems to have been practised by the Stoics. The writer subsequently saw that the principle might easily be misapplied, so as to sweep away the whole doctrine of incommensurables, and, in fact, the whole Weierstrassian way of regarding the calculus. In 1896 William James published his *Will to Believe*, and later his *Philos. Conceptions and Pract. Results*, which pushed this method to such extremes as must tend to give us pause. The doctrine appears to assume that the end of man is action—a stoical axiom which, to the present writer at the age of sixty, does not recommend itself so forcibly as it did at thirty. If it be admitted, on the contrary, that action wants an end, and that that end must be something of a general description, then the spirit of the maxim itself, which is that we must look to the upshot of our concepts in order rightly to apprehend them, would direct us towards something different from practical facts, namely, to general ideas, as the true interpreters of our thought. Nevertheless, the maxim has approved itself to the writer, after many years of trial, as of great utility in leading to a relatively high grade of clearness of thought. He would venture to suggest that it should always be put into practice with conscientious thoroughness, but that, when that has been done, and not before, a still higher grade of clearness of thought can be attained by remembering that the only ultimate good which the practical facts to which it directs attention can subserve is to further the development of concrete reasonableness; so that the meaning of the concept does not lie in any individual reactions at all, but in the manner in which those reactions contribute to that development. Indeed, in the article of 1878, above referred to, the writer practised better than he preached; for he applied the stoical maxim most unstoically, in such a sense as to insist upon the reality of the objects of general ideas in their generality.

A widely current opinion during the last quarter of a century has been that reasonableness is not a good in itself, but only for the sake of something else. Whether it be so or not seems to be a synthetical question, not to be settled by an appeal to the principle of contradiction—as if a reason for reasonableness were absurd. Almost everybody will now agree that the ultimate good lies in the evolutionary process in some way. If so, it is not in individual reactions in their segregation, but in something general or continuous. Synechism is founded on the notion that the coalescence, the becoming continuous, the becoming governed by laws, the becoming instinct with general ideas, are but phases of one and the same process of the growth of reasonableness. This is first shown to be true with mathematical exactitude in the field of logic, and is thence inferred to hold good metaphysically. It is not opposed to pragmatism in the manner in which C. S. Peirce applied it, but includes that procedure as a step. (C.S.P.)

It is of course legitimate to demand a reason for reasonableness; to do so is only to ask why we think—a question to which a genetic answer would seem to be afforded by certain forms of pragmatism. We may say (cf. SELECTION, in psychology) that reasonableness, or truth, is due to practical adjustments, and that the system of truths is developed by the selection of concrete relationships which 'work.' But it is quite another thing to make this genetic account of the origin and selection of 'truth' a philosophy of reality. For just the general or universal meaning of the system as a whole, the purpose or function which the concrete items selected as 'workable' subserves, and the environment or real world in which the entire movement takes place—all these are by definition outside the sphere of operation of pragmatism. Pragmatism is really an attempt to construe all reality 'retrospectively'—as adequately given in the system of concrete practically derived truths—i.e. as empirical 'science'; and while nominalism may invoke it, it still remains to prove nominalism. Cf. what is said under ORIGIN *versus* NATURE. In the words of Peirce (comment on this article): 'Nominalism, up to that of Hegel, looks at reality retrospectively. What all modern philosophy does is to deny that there is any *esse in futuro*.' Urban (*Psychol. Rev.*, July, 1897) holds that while the concrete details of empirical knowledge may be due to 'utility selection'—as practical 'workables'—yet the structural principles of thought cannot be so accounted for. They have no application *as generals*, and so would

have to the pragmatist no adequate 'reason for being.'

The definition by W.J. above, however, seems, by including 'experiences to be expected,' to broaden the application of the principle.

Literature: besides the works of PEIRCE and JAMES, as cited, see CALDWELL, Pragmatism, in Mind, Oct., 1900; MILLER, Philos. Rev., viii. (1899) 166; cf. CLIFFORD, Lect. and Essays (1886), 85 ff.; also the literature of SELECTIVE THINKING. (J.M.B.)

Praiseworthy: Ger. *preiswürdig, lobenswerth*; Fr. *méritoire*; Ital. *lodevole*. See APPROBATION, MERIT, and WORTH.

Prayer (rite of) [Lat. *precarius*, from *precari*, to beseech]: Ger. *Gebet*; Fr. *prière*; Ital. *preghiera*. The most characteristic form of worship, and consisting in spoken or unspoken petitions to the object of worship, and accompanied ordinarily with praise, confession, and thanksgiving. (A.T.O.)

Pre- and **Post-millenarianism**: see MILLENARIANISM. *Pre-millenarianism*: the belief that the second coming of Christ is to precede the millennial era, and that he is to reign in person on earth during that period.

Post-millenarianism: the belief that the second advent will occur at the close of the millennial period and be followed by the general resurrection and the last judgment.

Literature: see references under MILLENARIANISM. (A.T.O.)

Precise [Lat. *praecisus*, abridged through Fr.]: Ger. *präcis*; Fr. *précis*; Ital. *preciso*. (1) Having that element of accuracy which consists in strict curtailment of superfluity. A precise narrative is one from which subjective interpolations have been rigidly excluded. A precise definition is one from which inessential characters are excluded. The definition of a circumference as 'an unterminated line in a plane, everywhere at the same distance from a point within,' will be rendered precise by cutting off the word 'within.' In English the word is used more vaguely than in French.

(2) In physics it means having a very small error in consequence of the conscientious application of the most refined methods of measurement.

(3) In older writers the adjective is sometimes applied to a noun to signify that that noun is to be understood in its precise sense, without reference to accidental characters often associated with it. (C.S.P.)

Precision [Lat. *praecisio*, through Fr.]: Ger. *Präcision*; Fr. *précision* (in all the senses of the English word; but in the technical logical sense it is obsolete in Fr.); Ital. *precisione*. (1) A high degree of approximation, only attainable by the thorough application of the most refined methods of science.

(2) Its earlier meaning, still more or less used by logicians, is derived from a meaning given to *praecisio* by Scotus and other scholastics: the act of supposing (whether with consciousness of fiction or not) something about one element of a percept, upon which the thought dwells, without paying any regard to other elements. Precision implies more than mere discrimination, which relates merely to the essence of a term. Thus I can, by an act of discrimination, separate colour from extension; but I cannot do so by *precision*, since I cannot suppose that in any possible universe colour (not colour-sensation, but colour as a quality of an object) exists without extension. So with *triangularity* and *trilaterality*. On the other hand, precision implies much less than dissociation, which, indeed, is not a term of logic, but of psychology. It is doubtful whether a person who is not devoid of the sense of sight can separate space from colour by dissociation, or, at any rate, not without great difficulty; but he can, and, indeed, does do so, by *precision*, if he thinks a vacuum is uncoloured. So it is, likewise, with space and tridimensionality.

Some writers called every description of abstraction by the name *precision*, dividing precision into the real and the mental, and the latter into the negative and the positive; but the better usage named these *abstraction*, divided into *real* and *intentional*, and the latter into *negative* (in which the character from which abstraction is made is imagined to be *deniable* of the subject prescinded) and into *precisive abstraction* or *precision*, where the subject prescinded is supposed (in some hypothetical state of things) without any supposition, whether affirmative or negative, in respect to the character abstracted. Hence, the *brocard*: *abstrahentium non est mendacium* (generally enunciated in connection with the *De Anima*, III. vii. 7). Scotus (in II. *Physic.*, *Expositio* 20 *textus* 18) says: 'Et si aliquis dicat, quod Mathematicis tunc faciunt mendacium: quia considerant ista, quasi essent abstracta a motu, et materia; quae tamen sunt coniuncta materiae. Respondet, quod non faciunt mendacium: quia Mathematicus non con-

siderat, utrum id, de quo demonstrat suas passiones, sit coniunctum materiae, vel abstractum a materia.' This is not the place to treat of the many interesting logical, as well as psychological, discussions which have taken place concerning precision, which is one of the subjects which the scholastics treated in a comparatively modern way, although it leads directly to the question of nominalism and realism. It may, however, be mentioned that Scotus in many places draws a certain distinction variously designated by him and his followers (its nature and application is perhaps made as clear as anywhere in the *Opus Oxon.*, III. xxii. qu. unica, 'Utrum Christus fuerit homo in triduo,' i. e. between the crucifixion and the resurrection), which the Thomists mostly dispute. There is some account of the matter in Chauvinus, *Lexicon* (2nd ed.), under 'Praecisio.'

Hamilton has some remarks on the use of the words *abstract* and *prescind*, which could hardly come from any other man of equal learning and power, because no other such man is liable to be utterly confused by a slight complication. The remarks are mentioned here, because they have misled some students (*Lects. on Met.*, xxxv; *Lects. on Logic*, vii). (C.S.P.)

Precocity [Lat. *praecox*, early, ripe]: Ger. *Frühreife, Altklugkeit*; Fr. *précocité*; Ital. *precocità*. The relatively early development of a physiological or psychological function.

Wherever the time of appearance or the rate of development of a given power has been measurably determined, any marked anticipation of this period or development may properly be termed precocity. Infants may thus be precocious in their acquisition of the power to walk or to speak, and the like. There may also be a special precocity of the musical sense, of artistic capacity, of motor skill, &c. The term is most frequently used with regard to general intellectual attainments in early years. Instances of unusual precocity in the lives of men of genius are readily cited, and have led to the discussion of the general relations between precocity and genius (see Galton, *Hereditary Genius*). It is also stated that precocious children occur relatively often in families some of whose members present neurotic traits, and are themselves liable to mental disorder. Cf. Genius. (J.J.)

Preconception [Lat. *prae* + *conceptio*]: Ger. *Vorbegriff*; Fr. *préconception*; Ital. *pregiudizio*. (1) Used vaguely and popularly for anticipation with reference to a particular idea or event which, carrying the suggestion of prejudgment or mental bias, is said to be preconceived.

(2) The term might well serve a technical use as designating the mental process of a dispositional or notional character preliminary to the determination of a concept. See Conception. (J.M.B.)

Predesignate [a word formed by Sir W. Hamilton by composition from Lat. *prae*, in front of, and *designatus*, marked out]: (not in use in the other languages). (1) A term applied by Hamilton to verbal propositions whose quantity, as universal or particular, is expressed (*Lects. on Logic*, xiii).

(2) By C. S. Peirce applied to relations, characters, and objects which, in compliance with the principles of the theory of probability, are in probable reasonings specified in advance of, or, at least, quite independently of, any examination of the facts. See Probable Inference (2).

For example, the laws of England will, in the long run, cause the majority of English sovereigns to be males. In that sense it was unlikely that the successor of William IV would be a queen. But it would be absurd to say this after knowing that there was no heir to the crown so near as the Princess Victoria; and, in like manner, to say that it was not very unlikely that Queen Victoria's successor would be a queen was true enough as long as the character of her progeny was not known, or, if known, was not taken account of, but false considering the number of her sons and grandsons. In such cases of deductive probable inference the necessity of the predesignation is too obvious to be overlooked. But in indirect statistical inferences, which are mere transformations of similar deductive consequences, and the validity of which, therefore, depends upon precisely the same conditions, the necessity of the predesignation is more often overlooked than remarked. Thus Macaulay, in his essay on the inductive philosophy, collects a number of instances of Irish whigs—which we may suppose constitute a random sample, as they ought, since they are to be used as the basis of an induction. By the exercise of ingenuity and patience, the writer succeeds in finding a character which they all possess, that of carrying middle names; whereupon he seems to think that an unobjectionable induction would be that all Irish whigs have middle names. But he has violated the rule, based on the theory of probabilities, that the

character for which the samples are to be used as inductive instances must be specified independently of the result of that examination. Upon the same principle only those consequents of a hypothesis support the truth of the hypotheses which were predicted, or, at least, in no way influenced the character of the hypothesis. But this rule does not forbid the problematic acceptance of a hypothesis, which has nothing to do with the theory of probability. (C.S.P.)

Predestination [Lat. *praedestinatio*, a determining beforehand]: Ger. *Prädestination*; Fr. *prédestination*; Ital. *predestinazione*. The aspect of the divine foreordination which applies to moral agents as predetermining either their election to eternal life or their reprobation. See FOREORDINATION. (A.T.O.)

Predetermination [Lat. *prae* + *determinatus*, limited]: Ger. *Predetermination*; Fr. *prédétérmination*; Ital. *predeterminazione*. (1) DETERMINATION (q. v.; especially psychical, ad fin.) beforehand. (2) PREDESTINATION or FOREORDINATION (q. v.). (J.M.B.)

Predeterminism: DETERMINISM (q. v., various topics).

Predicable [Lat. *praedicabilis*, meaning in classical Lat. praiseworthy]: Ger. *Prädicabilien* (pl.); Fr. *prédicable*; Ital. *predicabile*. One of the five logical kinds of predicates of the early peripatetic school: genus, species, difference, property, accident (*γένος*, *εἶδος*, *διαφορά*, *ἴδιον*, *συμβεβηκός*), also called the *quinque voces* or *modi praedicandi*.

The indications, at present, are that the word was first used in the logical sense in translations from the Arabic. For Albertus Magnus, who did little more than report the views of Arabians, explains at considerable length the appropriateness of the term, as if it were a new one (*In praedicabilibus*, tr. ii. cap. i). It was, however, probably earlier that it was used by Lambert of Auxerre (Prantl, *Gesch. d. Logik*, iii. 28, note 114), who gives somewhat similar explanations.

Persons beginning the study of logic had better give such time as is necessary to reading the *Isagoge* of Porphyry, one of the best executed pieces of logical exposition that ever was written, superior in that respect to anything in the *Organon*, except the first book of the *Prior Analytics*. There seems to be nothing in the book which is not in Aristotle. A few sentences in the first part of the *Topics* (I. iv. 2) virtually contain the whole matter, which in the following chapter is put together substantially as Porphyry unites it. Still, it must be admitted that the mode of colligation is here no small matter. Before Porphyry, Apuleius has stated the doctrine nearly as well, and Prantl thinks he can detect it in its matured form even in Theophrastus; but this claim is excessive. One is inclined to think that the author who expounded the doctrine with such remarkable vigour must have thought it out for himself.

The school definitions of predicable are all very bad. That of Burgersdicius is: 'Predicables are what are affirmed of many truly, properly, naturally, and immediately.' Blundevile says: 'Predicables are certayne degrees, or rather pedigrees of words that be of one affinitie, shewing which comprehend more, and which comprehend lesse.' Most of the books define universals instead of predicables, or say that predicables differ from universals only in being spoken of a subject instead of being in a subject. It is easy to see that this does not answer. A universal is 'aptum natum dici de pluribus.' Such is any general term, as *man*. But the five terms genus, species, difference, property, accident, are surely not ordinary class names. Some say they are second intentions. This is very good indeed, so far as it goes; but it is not sufficiently definite.

Kant undertook to set up his own 'predicables of the pure understanding,' which were to be derivative conceptions under the categories (*Krit. d. reinen Vernunft*, 1st ed., 82). (C.S.P.)

Predicament [the Eng. form of the Lat. *praedicamentum*, translating Gr. *κατηγορία*, category (Aristotle)]: Ger. *Praedicament*; Fr. *catégorie*; Ital. *categoria*. As a term of philosophy, predicament is exactly equivalent to CATEGORY (q. v.). Cf. Trendelenburg, *Beitr. z. Logik*; Baldwin, *Handb. of Psychol.*, i. chap. xiv. § 4; Peirce, *Proc. Amer. Acad. Arts and Sci.*, May, 1867. (C.S.P.)

Predicate [Lat. *praedicatum*, from *prae* + *dicare*, to make public; used in Latin since Boethius, A. D. 500, in the logical sense. It was used by Boethius to translate *κατηγόρημα*, *κατηγορούμενον*, or *τὸ ὅ* of a proposition. *Praedicatio*, owing to its familiarity in the sense of preaching, was a little later in becoming a term of logic]: Ger. *Prädicat*; Fr. *attribut*, *prédicat*; Ital. *predicato*. (1) That element of a PROPOSITION (q. v.) which is brought into relation to the SUBJECT (q. v.). Cf. also JUDGMENT, and REASONING. (J.M.B.)

(2) The view which pragmatic logic takes

of the predicate, in consequence of its assuming that the entire purpose of deductive logic is to ascertain the necessary conditions of the truth of signs, without any regard to the accidents of Indo-European grammar, will be here briefly stated. Cf. NEGATION.

In any proposition, i.e. any statement which must be true or false, let some parts be struck out so that the remnant is not a proposition, but is such that it becomes a proposition when each blank is filled by a proper name. The erasures are not to be made in a mechanical way, but with such modifications as may be necessary to preserve the partial sense of the fragment. Such a residue is a *predicate*. The same proposition may be mutilated in various ways so that different fragments will appear as predicates. Thus, take the proposition 'Every man reveres some woman.' This contains the following predicates, among others:

'—— reveres some woman.'

'—— is either not a man or reveres some woman.'

'Any previously selected man reveres ——.'

'Any previously selected man is ——.'

See NEGATION. (C.S.P.)

Predication [Lat. *praedicare*, to assert]: Ger. *Aussage, Prädikation*; Fr. *attribution, détermination*; Ital. *affermazione*. (1) In psychology: the determination of a conceptual whole by the process of consciously including within it, or excluding from it, a new conceptual element.

The essential mark of the subject-predicate relation is that it constitutes that advance in thought which is expressed or expressible in a sentence. Thus we find that grammarians distinguish between the merely defining or determining use of adjectives, participles, &c., and their predicative or declarative function. To explain the nature of the subject-predicate relation is also to explain why discourse is broken up into distinct sentences. The required explanation is not far to seek, if we start from the popular use of the word subject as indicating the general topic or universe of discourse. The predicate of the subject, in this sense, is the whole discourse through which it receives determination and specification. Predication, from this point of view, consists just in the gradual definition and specification of what is at the outset relatively indefinite and indeterminate. It is because this process takes place gradually by a successive concentration of attention that language is divided into sentences. 'The predicate of a sentence is the determination of what was previously indeterminate. The subject is the previous qualification of the general topic or universe of discourse to which the new qualification is attached. . . . Sentences are, in the process of thinking, what steps are in the process of walking. The foot on which the weight of the body rests corresponds to the subject. The foot which is moved forward to occupy new ground corresponds to the predicate' (Stout, as cited below, ii. 213). Symbolically, the process may be represented as follows: $a = ab$, $ab = abc$, $abc = abcd$, and so on, a formula suggested by Baldwin for such a 'conceptual interpretation' of the thinking processes. In continuous thought, so far as it is continuous, all determinations of the general topic which have emerged up to a certain point form an integral part of the subject, to which all subsequent determinations are attached as predicates. Consider the following: 'I took the train to London; I arrived at 12 p.m.; I went to an hotel; I found that all the rooms were taken.' The 'I,' which is the grammatical subject of the last sentence, is qualified by those which preceded. The full sentence is: 'I, having taken the train to London, and having arrived at 12 p.m., on going to an hotel found that all the rooms were taken' (Paul, *Princ. of the Hist. of Language*, Eng. trans., 144 ff.). See the adjacent topics, and cf. JUDGMENT.

Literature: BALDWIN, Handb. of Psychol., Senses and Intellect, 283 ff.; STOUT, Analytic Psychol., ii. 212 ff.; BOSANQUET, Essentials of Logic, 108 ff.; PAUL, as cited above, 144 ff. (G.F.S., J.M.B., C.L.F.)

(2) In logic: the joining of a predicate to a subject of a PROPOSITION (q.v.) so as to increase the logical breadth without diminishing the logical depth.

On the relation between the psychological and the logical views of predication, see PROPOSITION (1).

This still leaves room for understanding predication in various ways, according to the conception entertained of the dissection of a proposition into subject and predicate. It is a question under dispute to-day whether predication is the essential function of the proposition. Some maintain that the proposition 'It rains' involves no predication. But if it is an assertion, it does not mean that it rains in fairyland, but the very act of saying anything with an appearance of seriously meaning it is an INDEX (q.v.) that forces the person

addressed to look about to see what it is to which what is being said refers. The 'rains' recalls to his mind an image of fine up-and-down lines over the field of view; and he looks sharply out of the window, fully understanding that that visible environment is indicated as the subject where the lines of falling drops will be seen. In like manner, there is a predication in a conditional or other hypothetical proposition, in the same sense that some recognized range of experience or thought is referred to. (C.S.P.)

So in all compound propositions, some recognized range of experience, thought, or belief is referred to, even though, in a given case, by an accident of language, we are permitted to completely suppress both subject and copula (cf. Baldwin, *Handb. of Psychol.*, i, chapter on Thought; Venn, *Empirical Logic*). Just as (1) 'Every a is b' means 'Granted that any object is a, it may be safely concluded that it is also b,' so (2) 'If a is b, c is d' means 'For whatever time, place, or combination of circumstances you grant that a is b, you may also be sure that c is d'; and in particular, just as (1) is identical in logical import with 'Every object is either not a or else b,' so (2) when expressed in the form 'Either a is not b or c is d' has for its full meaning 'Time, place, and circumstance imply that a is not b or else that c is d,' or, 'Whatever is, a is not b or c is d,' or, 'What occurs is that a is not b or that c is d.' Hence in symbolic logic it is perfectly justifiable to use the same sign for the subject in both the simple and the compound proposition (and without regard to whether the subject is expressed or understood in common language):

$$(1) \quad \infty \leqslant \bar{a} + b$$

$$(2) \quad \infty \leqslant (a \leqslant b + (c \leqslant d).$$

For the symbols used see PROPOSITION. (C.L.F.)

A few of the most frequently recurring scholastic phrases follow.

Abstract predication: predication of a subject considered in the abstract.

Accidental predication: predication of an accident.

Analogical predication; a rather favourite expression of Aquinas: predication in which the predicate is taken neither in its strict sense nor in an unrelated sense, but in a peculiar sense for which there is a good reason, as when a statue is said to be a man.

Complete predication: predication in which the whole nature of the thing is formally affirmed.

Denominative predication: predication in which that whose nature it is to be a subject is taken as the subject, and something whose nature it is to be predicated is taken as the predicate; a predication of an accident of a substance. (It is well discussed by Scotus, *In univ. Porph.*, 9. 16, 'Utrum haec sit vera, *Homo est animalis*,' where, as in the majority of scholastic disputations, the conclusion is foregone, and the interest lies in the formidable difficulties and how they are to be overcome.) Denominative predication, in its proper sense, is predication of an accidental concrete term of its own subject; in a broad sense, it is the predication of any concrete of a suppositum, or of any subject of less breadth; in the widest sense, it is predication of any predicate of any subject. Denominative predication may be *a posteriori* or *a priori*, as homo est albus, rationale est substantia, homo est animal.

Determinative predication: same as *denominative predication*.

Dialectic predication, as defined by Aristotle (I. *Top.*, x): the predication of a general term in a proposition which may result from an argument in a probable place, and not reducible to anything prior.

Direct predication: predication in the usual sense of representing that the breadth of the subject belongs to the predicate, and the depth of the predicate to the subject; or, in scholastic language, it is predication of a higher term of a lower one, of a passion of a subject, of an accident of a subject, of a mode of a quiddity, of a difference of a genus. See *Indirect predication*, below.

Equivocal predication: predication which may be taken in two unrelated senses.

Essential predication: in which the predicate is wholly contained in the essence of the subject. It is, therefore, in Kant's sense, an analytical judgment. But neither Kant nor the scholastics provide for the fact that an indefinitely complicated proposition, very far from obvious, may often be deduced by mathematical reasoning, or necessary deduction, by the logic of relatives, from a definition of the utmost simplicity, without assuming any hypothesis whatever (indeed, such assumption could only render the proposition deduced simpler); and this may contain many notions not explicit in the definition. This may be illustrated by the following: Man is a rational animal; hence, whatever is not a man is either, on the one hand, not rational, while either at the same time being an animal or else benefiting nothing except such objects as love

nothing but fairies, or, on the other hand, is not an animal, while either being rational or standing to whatever fairy may exist in the relation of benefiting something that loves it. Now, if it be said that that is an analytical judgment, or essential predication, neither the definition of the scholastics nor that of Kant is adequate. But if it be said that it is not an essential predication, or analytical judgment, then the accidental predication and the synthetical judgment may be a necessary consequence, and a very recondite one, of a mere definition, quite contrary to what either Kant or the scholastics supposed and built upon. Cf. Scotus (*In univ. Porph.*, 9. 12), who makes essential predication the predication of genus, species, or difference.

Exercised predication. The distinction between exercised and signate predication belongs to Scotus. (The passage which Prantl attributes to Antonius Andreas is a quotation *verbatim* from Scotus, as often naturally happens in Prantl's *Geschichte.*) A *signate* predication is one which is *said to be* made, an *exercised* predication is one which *is* made; so that Scotus says: 'A praedicari signato ad praedicari exercitum non tenet consequentia per se in eisdem terminis.' Scotus gives the following examples of the distinction, where the exercised predication is marked E, the signate S: S, *Genus praedicatur de specie*; E, *Homo est animal.* (The Lyons text here transposes the terms, which we give correctly.) S, *nego*; E, *non.* E, *tantum*; S, *excludo.* The abstract definition of Scotus is: '*Esse* in rebus primae intentionis illud exercet quod *praedicari* signat in secundis intentionibus.' Exercised predication is distinguished into *praedicatio de proprio supposito* and *praedicatio de subiecto*; the former is essential, the latter accidental.

Formal predication: predication where the predicate is in the concept of the subject, independent of any extrinsic cause or of any particular matter *in qua.* The difference between formal and essential predication is somewhat trivial and confused.

Identical predication: the predication of a term of itself.

Incomplete predication: see *Complete predication.*

Indirect predication has two meanings. In one sense, it might better be called *relative* predication, since it is the predication of some term which occurs in the predicate in an oblique case, as angles are predicated of triangles. But, in another sense, Chauvinus (*Lexicon*, 2nd ed., 1713, 'Praedicatio') says: 'Praedicatio contra *naturam*, seu *inordinata*, quae alias etiam dicitur *indirecta*, ea est vel in qua inferius de superiori in eadem linea praedicamentali, aut id quod se habet per modum materiae de eo quod se habet per modum formae dicitur; . . . vel, in qua species de sua dicitur differentia . . . vel, in qua substantia dicitur de accidente connotativo.' Mauritius Hibernicus, in his *Expositio quaest. D. Subtilis in quinque Vniv. Porph.*, qu. i. art. 31, says, 'Voco communiter praedicationem directam,' and proceeds to give substantially the definition of Chauvinus.

Inordinate predication: see quotation from Chauvinus under *Indirect predication.*

Intrinsic predication: one in which the predicate is in the subject independently of the relations of the latter to other things.

Natural predication: when the subject and predicate ought to be so related according to their nature. This is substantially the definition given in many books; but it conveys little idea of how the expression is used. Natural predication is always divided into the identical and direct; non-natural predication is either *indirect*, i. e. *contra naturam*, or it is *praeter naturam*, i. e. *per accidens.* Examples of indirect predication, where the subject is related to the predicate as form to matter, are *alba est nix, animal est homo.* Examples of predication *praeter naturam*, where subject and predicate are related to some third term, as form to matter, are *album est dulce, dulce est album.* Examples of direct predication: *nix est alba, homo est animal.* Examples of identical predication: *gladius est ensis, Plato est Plato* (Conimbricenses *in Praef. Porph.*, q. i. art. 4).

Non-natural predication: see *Natural predication.*

Proper predication: a predication in which the verb and predicate are taken in their proper signification.

Qualificative predication: see *Predication in quale.*

Quidditative predication: see *Predication in quid.*

Signate predication: see *Exercised predication.*

Univocal predication: predication of a univocal term.

Predication de omni is defined by Aristotle in the *dictum de omni*; that is, what is predicated of a subject universally, or *de omni*, is predicated of everything of which that subject is predicated.

Predication in eo quod quid (translation of

Porphyry's ἐν τῷ τί ἐστι κατηγορεῖσθαι) occurs in the translation of the *Isagoge* by Marius Victorinus, and means predication of the genus and species. In some of the late scholastics it is distinguished from other predication *in quid*, and is confined to predication of the *genus* (see Eckius, *In Petr. Hisp.*). But others, as the Mainz doctors, retain the earlier meaning.

Predication in eo quod quale: same as predication *in quale*, from which, however, some of the later writers discriminate it.

Predication in quale, as most commonly used, is predication of difference, property, or accident. But it is also, not infrequently, restricted to predication of the property or accident. Albertus Magnus (*In predicabilibus*, tr. iii. cap. iv) distinguishes four different senses of predication *in quale*.

Predication in quale quid: predication of a specific difference.

Predication in quid (the expression appears in the 12th century. It is an abbreviation of *in eo quod quid*). Used in a number of senses, for which see any good mediaeval logic; and especially for predication of the genus and species, most strictly of the latter.

Predication per accidens: see *Natural predication.*

Predication per causam: a predication that the predicate stands in a causal relation to the subject.

Predication per comitantiam or *concomitantiam*: a predication that the predicate accompanies the subject.

Predication per essentiam: essential predication.

Predication per se: see PER SE.

Predication quasi in quid = *in quale quid.*

(C.S.P.)

Predicative Proposition. The old name for a categorical PROPOSITION (q.v., also CATEGORICAL), used by Apuleius, Marcianus Capella, and Boethius. Cassiodorus, however, has *categoricus*, which was used by Abelard and subsequent logicians. The expression has been revived by some modern logicians who do not think that all propositions, nor even all categorical propositions, such as 'It rains,' predicate anything. (C.S.P.)

Prediction [Lat. *praedictio*, a foretelling]: Ger. *Prophezeiung*; Fr. *prédiction*; Ital. *predizione.* (1) One of the functions of prophecy by virtue of which the prophet becomes a seer and reader of the future. See PROPHECY. (A.T.O.)

(2) In logic: see PREDESIGNATE (2), and cf. PROBABLE INFERENCE (2).

Predisposition [Lat. *prae* + *dispositio*]: Ger. *Prädisposition, Anlage*; Fr. *prédisposition*; Ital. *predisposizione.* An inherited tendency to act in certain ways. A predisposition is thus an inherited DISPOSITION (q.v.). (J.M.B.–G.F.S.)

We are thus making predisposition or inherited disposition subject to the distinction of the older usage, which contrasted DISPOSITION (q.v., meaning 2) with habit. Hamilton finds the contrast in the Greek terms διάθεσις and ἕξις (*Metaphysics*, Mansel and Veitch, ed. N. Y., Lect. x. 124). The prefix of the latter term appropriately marks the innate character of predispositions. This meaning of predisposition covers the popular use of the term as referring to the permanent elements of character and endowment recognized as ingredients in temperament (noted by Aristotle, *Categories*, chap. viii; ref. supplied by eds. to Hamilton, in the passage quoted above). This also makes predisposition an adequate translation of Anlage (mental), following the translation of Groos' *Play of Man*, as against that of Külpe's *Outlines of Psychology*, in which disposition is used without qualification. (J.M.B., G.F.S.)

Predisposition (in medicine): Ger. *Prädisposition*; Fr. *prédisposition*; Ital. *predisposizione.* A physical or mental liability or susceptibility in a particular direction.

The word, like the terms bent, trait, temperament, diathesis, is an important one in the discussion of heredity and the distribution of endowment, to indicate an inborn tendency or capacity to develop readily in a given direction. Predisposition is used of general emotional and mental character rather than of individual traits; it is also frequently employed in regard to abnormal tendencies (see art. 'Predisposition in Disease,' in Quain's *Dictionary of Medicine*), such as a predisposition to neurasthenia, to hysteria, &c. In the discussion of the aetiology of a mental disorder the predisposing causes are always considered. See DIATHESIS. (J.J.)

Pre-established Harmony: Ger. *prästabilirte Harmonie*; Fr. *harmonie préétablie*; Ital. *armonia prestabilita.* The name given by Leibnitz to his theory (1) of the relation of the monads to one another; (2) of spirit to matter, of the soul to the body. The last is the commoner use, but is, relatively speaking, superficial.

The problem of the influence of mind upon body had been brought to the front by Descartes (see OCCASIONALISM). Leibnitz

holds that there is no actual influence exercised by one of them upon the other, nor does God interfere to produce change in one upon occasion of change in the other. But he has eternally harmonized the two so that changes in one synchronize with, and represent, changes in the other. Leibnitz uses frequently the comparison of two clocks which keep perfect time. The vulgar view would assume that some influence passed from one to the other; Occasionalism, that an outsider changes one when the other changes; this theory, that they were originally so perfectly harmonized that no departure of one from the other can take place. In its wider philosophic sense, pre-established harmony means that while each monad acts out its own nature undisturbed by any other, yet each is so constituted as to reflect, mirror, or represent, 'from its own point of view,' the entire universe. The active or developed side of each monad is spirit; its passive or undeveloped side is matter. The active gives the law to the passive, i. e. defines its end or idea. Hence the universal harmony of mind and matter, thought and extension—Leibnitz's dynamic interpretation of Spinoza's parallelism of the two attributes. Cf. the standard works on the history of philosophy. (J.D.)

Pre-existence [Lat *prae*+*existens*, existing]: Ger. *Präexistenz*; Fr. *préexistence*; Ital. *preesistenza*. (1) Identical with TRANSMIGRATION (q. v.).

(2) The doctrine of certain Christians that the human soul of Jesus Christ existed prior to his conception in the flesh.

The advocates of this view teach that the human soul of Christ existed before the creation of the world, in union with his divine nature. This doctrine has always been held in connection with a belief in the Divinity of Christ. It has not had very much vogue, and has never risen to the dignity of a recognized heresy.

Literature: WATT, Works, v. 274–385; HAAG, Histoire des Dogmes Chrétiens; MÜLLER, Doct. of Sin; LIDDON, Divinity of Christ. (A.T.O.)

Preformation [Lat. *prae*+*forma*, shape]: Ger. *Präformation*; Fr. *préformation*; Ital. *preformazione*. The modern version of the old emboîtement theory of development, according to which the germ contained all the parts of the adult organism preformed, but minute; so that the development of the individual consisted merely in an unfolding or 'evolution,' and growing, of parts already formed.

Modern preformism holds that, although the parts are not actually preformed as such in the germ, yet they are represented by material elements having a definite organization. Thus development would essentially consist in the sorting out and increase of these elements. According to this theory, then, there exists a germinal localization, such that every part of an adult organism is represented by certain particles, by some definite region, of the germ which gives rise to it.

The theory of preformation, in its early and crude form, was supported by Malpighi, Haller, and Bonnet, against the rival theory of 'epigenesis' put forth by Harvey in the 17th century. It did not survive the criticisms of Buffon, Maupertius, and Wolff. The theory, in its modern garb, is due chiefly to the work of Weismann and Roux. Cf. EPIGENESIS. The form preformism is also in use.

Literature: C. BONNET, Considérations sur les Corps organisés (1776); C. S. WOLFF, Theoria generationis (1774); E. HAECKEL, Hist. of Creation; C. O. WHITMAN, Evolution and Epigenesis, Woods Holl Biol. Lects. (1894); E. B. WILSON, The Cell in Devel. and Inheritance (1896). (E.S.G.)

Preformism: see PREFORMATION.

Prehension [Lat. *prehensus*, from *prehendere*, to seize]: Ger. *Prehension*; Fr. *préhension*; Ital. *presa*, (*il*) *prendere*. The act and the power of grasping.

Applied especially to the act of grasping with the thumb opposite the fingers, as do monkeys (anthropoids) and man. This power is considered to have been of considerable importance in the evolution of the primates. It is also called 'thumb-grasping.' (J.M.B.)

Premise (and **Premiss**) [two distinct words, recognized as such by older writers, but for the last century and more confounded. Premise is a legal word, derived from the Fr. *prémise*, which is a noun derived from the phrase *les choses prêmises*, used in inventories. Premiss is from the Fr. noun *prémisse*, and thence from the Low Lat. *praemissa*, which goes back, as a substantive, to the early part of the 13th century. But it was hardly looked upon as very good Latin at any time. *Propositio* replaced it, when elegance was preferred to technical accuracy]: Ger. *Vordersatz*, *Prämisse*; Fr. *prémisse*; Ital. *premessa*. A proposition, the consideration of which has logically affected, or contributed to the determination of, a conclusion of reasoning.

An enthymeme is usually defined as a

syllogism with a suppressed premise or premiss. Now, the expression of a train of thought may be elliptical, some thought being unexpressed in the confident anticipation that the reader, or hearer, will supply it. But in thought, a premise or premiss cannot be suppressed without ceasing to be either premise or premiss. If it be so suppressed, it enters into the leading principle of the inference. Every reasoning must proceed consciously upon some general principle, or it ceases to be a reasoning, and becomes a mere feeling of inability to think otherwise. On the other hand, when a principle of reasoning becomes by analysis distinctly apprehended and the precise effect which it has upon the conclusion understood, it becomes a *premise*, or, at least, a *premiss*. There is, therefore, no such thing as a suppressed *premiss*.

The word premiss became usual in the logical sense, in English, as early as Chaucer. In Wilson's *Rule of Reason* (1551) it does not occur, the phraseology there being like the following: 'The double repeate, whiche is a woorde rehearsed in bothe Proposicions, must not entre into the conclusion.' But in Blundevile's *Arte of Logicke* (1599) we read: 'A Syllogisme is a kinde of argument contayning three Propositions, whereof the two first, commonly called the premisses,' &c. In Watts's and other English logics it was spelt *premiss* and *premisses*. Johnson, however, in his *Dictionary*, gives *premises* in the plural and *premiss* in the singular, as distinct words, and remarks that the latter is little used in the plural outside of technical works. In such works the word spelt with two *s*'s continued to be employed. (C.S.P.)

The two forms of spelling, for the logical term, are used interchangeably in this work. (J.M.B.)

Premonition [Lat. *praemonitorius*, giving previous warning]: Ger. *Ankündigung, Vorläufer*; Fr. *prémonition, avertissement, pressentiment*; Ital. *premonizione, segni premonitori, presentimento*. A tendency to anticipate a coming occurrence apart from any causes or reasons which the subject himself can assign. The term presentiment is also in use. (G.F.S.–J.M.B.)

Some individuals form the habit of noting and watching such experiences, which habit renders them more apt to occur. Premonitions belong to the general fluctuations of mood and flow of thought, for which no detailed explanation is needed, except as their frequency or objective fulfilment demands explanation. Premonitory signs have been discussed in connection with the problem of TELEPATHY (q. v.) and the 'phantasms of the living.' See VERIDICAL HALLUCINATIONS. Significant symptoms occurring before an attack in certain mental diseases (epilepsy, hysteria) are termed AURA (q. v.). (J.J.)

The term is also used for a general mood of foreboding (Ger. Ahnung), often without specific reference. (J.M.B.)

Preordination [Lat. *prae* + *ordinare*, to ordain]: Ger. *Vorbestimmung*; Fr. *prédétermination, préordination*; Ital. *preordinazione*. See FOREORDINATION.

Preparation [Lat. *praeparatio*]: Ger. *Vorübung*; Fr. *préparation*; Ital. *preparazione*. The PRACTICE (q. v.) of a function in its immature and incomplete stages, by which its development and efficiency are furthered. Cf. HABITUATION, and EXERCISE.

Its principal use is in the German Vorübung. The concept has been developed by Groos in connection with PLAY (q. v.), which is considered preparation for the serious activities of adult life. See TERMINOLOGY, German, 'Uebung.' (J.M.B.)

Preperception [Lat. *prae* + *perceptio*, a taking]: Ger. *Präperception*; Fr. *préperception*; Ital. *prepercezione* (the equivalents are suggested). The ideal representation of an object preceding and facilitating the perception of it.

A term first used by G. H. Lewes (*Problems of Life and Mind*, 3rd series, Prob. 2, chap. x) and adopted by W. James, among others (see James, *Princ. of Psychol.*, i. 438–45). James appears to regard all mental preadjustment for perceiving an object as involving an anticipatory mental image; but this doctrine seems untenable. A batsman attending to the course of the ball as it comes from the hand of the bowler does not usually construct an anticipatory picture of the course it is going to take. If he does, his wicket is in great danger. (G.F.S., J.M.B.)

Prepossession: see PRECONCEPTION (1).

Prepotency [Lat. *prae* + *potens*, powerful]: Ger. *Präpotenz*; Fr. *suprématie, prépondérance*; Ital. *preponderanza*. (1) In zoology: when one parent transmits its hereditary characters in a stronger degree than the other parent, it is said to be prepotent or to have prepotency. Diminished potency in this respect, on the other hand, is called subpotency.

(2) In botany: when the pollen of two or more varieties is applied to the same stigma, that of one variety affects fertilization and is said to be prepotent.

Darwin carefully discussed the phenomena of prepotency in his *Animals and Plants under Domestication*. Romanes has considered them in relation to his hypothesis of PHYSIOLOGICAL SELECTION (q. v.).

Literature: C. DARWIN, Animals and Plants under Domestication, ii; G. J. ROMANES, Darwin and after Darwin, iii; GALTON, Nature, Jan. 27, 1898. (C.LL.M.)

Presbyopia [Gr. πρέσβυς, old, + ὤψ, eye]: Ger. *Presbyopie*; Fr. *presbytie, presbyopie*; Ital. *presbiopia*. A condition in which, owing to a growing inelasticity of the lens fibres, and to a decrease in the power of contracting the ciliary muscle, the near point of vision is removed to an inconvenient distance, with a corresponding diminution in the size of the retinal image, and a consequent difficulty in reading and in other occupations which require close vision.

The lens becomes progressively more rigid, and the powers of accommodation progressively decline from infancy onward. In the normal emmetropic eye, the disturbing condition of presbyopia is not reached before the age of 45 to 50 years; and for practical purposes may be said to appear when the near point has reached 22 cm. or 9 inches. The advent of presbyopia will be earlier in hypermetropic (hyperopic) eyes, and later in myopic eyes, while in extreme cases of myopia it simply counteracts that condition. Presbyopia is corrected by the use of lenses, which restore the ordinarily used focussing points for near vision. Cf. VISION (defects of). See Landolt, *Refraction and Accommodation of the Eye* (Eng. trans. by Culver, 1886), 572. (J.J.)

Prescience: see FOREKNOWLEDGE.

Prescription (in law) [Lat. *praescriptio*]: Ger. *Ersitzung* (for usucaption by possession), *Verjahrungsrecht* (for the law of negative prescription); Fr. *prescription*; Ital. *prescrizione*. A mode of acquiring a thing or right by long-continued and peaceable possession or use, without lawful interruption.

The law may affirmatively create a title, under such circumstances, in the possessor or user, which is *positive* or *acquisitive prescription*; or it may simply cut off any right of recovery by the original owner, which is *negative* or *extinctive prescription*.

'Possession may ripen into ownership; and this result may be produced either positively by the law declaring that the possessor is fully entitled after a certain time, or negatively by depriving adverse claimants of their remedies, if during a certain time they omit to exercise them' (Pollock, *Jurisprudence*, chap. vii. 178). In early Roman law *usucapio* was the term used to describe such a mode of getting title, by positive declaration of law, to mancipable property; *praescriptio* was the term for the negative defence of the statute of limitations, and for acquisition by possession or use of non-mancipable property. Justinian abolished the distinction. In English and American law a claim to a right by prescription rests on the legal fiction that it is to be presumed there was a grant which has been lost.

Literature: MARKBY, Elements of Law, chap. xiii; SOHM, Inst. of Roman Law, § 51, 2. As to prescription in international law see VATTEL, Droit des Gens, Liv. II. chap. xi. (S.E.B.)

Present (the specious) [Lat. *presens*]: for equivalents see TERMINOLOGY, English, 'Moment.' The *minimum sensibile* of time; a period of present time so short that the subject cannot distinguish relations of priority and subsequence between its parts.

The term 'specious' is used to distinguish the 'duration block,' which constitutes even the shortest concrete present as actually experienced from the conception of a present moment as a boundary line between preceding and succeeding time. The term is due to E. G. Clay, and it has been given currency by James. To quote James: 'The practically cognized present is no knife-edge, but a saddle-back, with a certain breadth of its own on which we sit perched, and from which we look in two directions into time. The unit of composition of our perception of time is a *duration*, with a bow and a stern, as it were—a rearward and a forward looking end.' The saddle-back metaphor and much else in James on the subject applies to any period of time, however prolonged, which subjective interest regards as present. For instance, I may say that I am at present writing a certain book: the present thus referred to may embrace years; but it is a saddle-back of time from which I regard the past and future. But on the whole it seems clear that James means by 'specious present' the irreducible minimum of duration necessary to constitute my concrete present. Cf. PRESENT TIME, TIME, TIME PERCEPTION, and SPACE.

Literature: E. G. CLAY, The Alternative, 167; W. JAMES, Princ. of Psychol., 609 ff.; L. W. STERN, Psychische Präsenszeit, in Zeitsch. f. Psychol., xiii. 330 ff.; STRONG, Psychol.

Rev., iii. 156; ROYCE, The World and the Individual. (G.F.S.–J.M.B.)

Present Time: Ger. *Präsens, Präsenszeit*; Fr. *présent, temps présent*; Ital. *presente, tempo presente*. The present is a portion of time marked off from other portions as including our actual conscious life.

The length of what we regard as the present time varies according to the interest involved. A period of any length may be regarded as present, if we have no motive for dividing it into prior and subsequent portions.

The present is distinguished from other portions of time not merely by formal relations of antecedence and subsequence, but by the signature or coefficient of psychical actuality (whatever this may be) that belongs to it. In particular, it is stamped as the moment of actual sensation. Ward lays great stress on this point: 'To a being whose presentations never passed through the transitions which ours undergo—first divested of the strength and vividness of impressions, again reinvested with them and brought back from the faint world of ideas—the sharp contrasts of "now" and "then," and all the manifold emotions they occasion, would be quite unknown' (*Encyc. Brit.*, art. Psychology, 64). Cf. PRESENT (the specious). For the philosophical questions which arise, see TIME. (G.F.S.–J.M.B.)

Presentation [Lat. *prae* + *esse*, to be]: Ger. *Vorstellung, Darstellung* (see TERMINOLOGY, German, 'Vorstellung'); Fr. *présentation*; Ital. *presentazione*. (1) An object in the special form under which it is cognized at any given moment of perceptual or ideational process. 'Any object of knowledge or thought' (Baldwin, *Elements of Psychol.*, Glossary).

(2) An object as it is cognized at any given moment of perceptual as distinguished from ideational process.

(3) Another word for object.

The first meaning is that which is recommended. When the mind is engaged upon an object, the object appears or presents itself under varying aspects in different phases and stages of the process. Each of these appearances is a presentation of one and the same object. I see a piece of sugar; I take it in my hand and I put it in my mouth. Throughout I am mentally occupied with a thing recognizable as objectively the same. But the sugar as seen, as lifted in the hand, as rolled on the tongue, is successively presented in varying ways. Similarly, if I am attempting to solve a geometrical problem, the problem and its conditions constitute my object throughout the whole train of thought. But in the various steps I take in order to find a solution, this object assumes different aspects. The one object comes before consciousness in a succession of presentations. I have a different presentation of it when the problem is solved from that which I had when I began upon it.

The limitation of the term presentation to perceptual consciousness has much to recommend it. It yields a neat expression for the distinction between perception and idea — perception being called presentation, and idea representation. But there are other sufficiently convenient ways of marking this distinction, and on the whole there seems to be a more pressing need for the word in the more comprehensive application which we propose for it. Ward consistently uses it in this wide sense, and he did much to make it a familiar term in English psychology. The third meaning ought not to be retained, because it is unwise to use the two words object and presentation in precisely the same way. (G.F.S., J.M.B.)

Presentationism: Ger. *Präsentationismus*; Fr. *présentationisme*; Ital. *presentazionismo* (suggested—E.M.). (1) Used by Hamilton for presentative, as opposed to representative, theories of knowledge. Cf. NATURAL REALISM. (J.M.B.)

(2) Used by recent writers as equivalent to phenomenalism: the theory that the only knowable reality is found in what is presented as conscious content to the knower. (J.D.)

(3) 'A doctrine the gist of which is that all the elements of psychical life are primarily and ultimately cognitive elements' (Ward, *Mind*, N.S., ii. 1893, 58).

The third sense is due to Ward, and we have given his definition. He quotes Hume as the first who explicitly formulated the doctrine: 'The mind is a kind of theatre where several perceptions successively make their appearance; pass, repass, glide away, and mingle in an infinite variety of postures and situations. There is properly no *simplicity* in it at one time nor identity in difference' (Hume, Green and Grose's ed., *Treatise*, i. 534). Ward attributes the doctrine to the 'school of Wundt' generally, though not to their master. He appears to refer especially to Münsterberg, who, however, can hardly be said to belong to such a 'school.' And yet, oddly enough, Münsterberg agrees with Ward that psychical activity is unpresented and unpresentable; only he

draws a different conclusion. He infers that as it is not presented, it cannot be described; and that since it is the business of psychology to describe, the psychologist cannot deal with it except by translating it into terms of something else which is describable, and therefore a matter of presentation. Ward, on the other hand, maintains that though it is not directly presented, yet we have an indirect cognition of it, obtained in a way which he has never fully explained; and that this cognition is sufficient to enable us to trace its function in psychical life. Münsterberg apparently holds that we have an indirect cognizance of it; but he regards this as unavailable in psychology, though it is of fundamental importance for philosophy.

In order to avoid presentationism (in sense 3), it is not necessary to adopt Ward's view that feeling and activity cannot be presented. It is only necessary to affirm that their psychical nature is not exhausted in the fact of their presentation. When they are presented they are presented as being something more and other than mere presentations. But this is true of all objects. A tobacco-pipe is presented; but this is not taken to constitute its whole being. The question remains, what is it presented as being? Besides being a presentation, it is also a tobacco-pipe. Similarly with feeling and activity; only their nature is psychical, whereas that of the tobacco-pipe is material. (G.F.S.)

Meanings (1) and (2) are both epistemological, and illustrate the way a term may mediate two opposing views: (1) is in the interest of realism, (2) in that of some form of subjective idealism. If meaning (3) be adhered to, neutrality may be secured in respect to epistemology. (J.M.B.)

Presentiment: see PREMONITION.

Pre-Socratic Philosophy: Ger. *vorsokratische Philosophie*; Fr. *philosophie présocratique*; Ital. *filosofia presocratica*. Philosophy in Greece prior to Socrates.

This may be properly considered under one topic, because it was mainly devoted to one problem, the study of nature. The Sophists form a transition to the Socratic philosophy. The earlier thinkers of the period (see under SCHOOLS OF GREECE for the names of the individual philosophers) are frequently called the Ionics; but as practically all Greek philosophy until the time of Aristotle was the work of Ionians (either in Asia or in Italy or at Athens), the term is liable to mislead. Two sub-periods may be distinguished in the period before the Sophists. The earlier thinkers stand in closer relation to previous religious or mythical views, and seek to substitute an intelligible hypothesis, based on real things or events, for the myths of the poets. In doing this they usually fix upon some one conception of seemingly fundamental importance and maintain it in a one-sided manner. The later thinkers of the period are freer from the mythical conceptions, and aim to adjust or construe the valuable elements in the earlier views. A distinction in the religious views which were influential at successive periods may also be noted. The earlier thinkers were most in touch with the Olympian religion, which concerned chiefly the deities of sky, earth, and ocean. The worship of chthonic deities, Dionysus, Demeter, &c., among the Orphic sect and in the Eleusinian mysteries, on the other hand, emphasized the immortality of the soul and its need of purification, thus directing the thought within, and introducing a dualism which had important ethical and metaphysical consequences. This religion influenced especially the Pythagoreans and Plato.

The myths which described the generation of the gods and the origination of worlds implied at least a view of a single, connected process, and of an inclusion of all in the universe within that process. The detached phenomena of sea or sky, or of successive days and seasons, were given unity and relation in such beings as Uranus (heaven) and Gaia (earth), or Dionysus. The work of the first philosophers was to substitute for these personifications actual concrete substances. They found ready to hand the conception that the world is one. They asked, 'From what did it come? What is the primal substance?'—calling their writings *περὶ φύσεως* (concerning the origin, or primal substance, or essential nature of things). These three connotations were probably all more or less involved in the term, though not as strictly distinguished until later.

The first answers selected, at least, actual substances, when Thales said 'water,' and Anaximenes 'air'; Anaximander's 'boundless' or 'infinite' suggests the chaos of the myths. All three of these Milesians regarded the world naïvely as animate, and its processes of change as spontaneous movements, hence they were called Hylozoists (regarding matter as animate).

Another religious and social conception found conspicuous recognition in the thought of the Ephesian Heraclitus (about 470 B.C.).

Like the Milesians, he names a primal substance, fire, of which all things are transformations; but to say that fire is the ultimate 'nature' of things and of the world is to emphasize a process, a flux, with a 'way downward' in which the change is from fire into things, and a 'way upward' in which things are becoming fire. The most fruitful conception in this thought was, as intimated, the principle of rational law (λόγος) or justice (δίκη), which controls this process and regulates the allotted (εἱμαρμένη) changes. The decree of Zeus, the destiny (μοῖρα) of the gods, the social and religious law of justice, have become the central conception for viewing a physical process, with implications which cling to the terms even in modern science. This law of changes gave a union of the 'one' and the 'many'—an antithesis which continually challenged the attention of the Greeks.

The characteristic of the Eleatics was a one-sided emphasis upon the first factor of this antithesis, the 'One.' Xenophanes, the religious satirist, criticized anthropomorphic conceptions of gods as born like mortals, and said that the One was God. Parmenides made this conception of oneness and permanence of determining and exclusive importance. What *is* must always have been and must always be: change is impossible, for this would imply that something could arise out of nothing, or pass into nothing, and both suppositions are absurd. This was not an abstractly logical principle, nor did it refer in the mind of Parmenides to the conservation of energy. 'What is' meant 'what occupies space.' The principle would then mean nearly the indestructibility of matter, except that matter had not yet been so abstractly conceived.

The earlier teaching of the Pythagoreans was religious and ethical rather than speculative. Like the Orphic religious societies, they emphasized the immortality of the soul (see Psyche) and the necessity of purifying it, thus preparing the way for a later, more complete separation between soul and body, and between the true being of the 'other world' and the present world of change. See Socratic Philosophy, Neo-Pythagoreanism, and Neo-Platonism. The astronomical and musical studies of the school reinforced the general demand for 'measure' or 'limit,' so fundamental in all Greek thought, and a later member of the school, Philolaus, regarded measure and number as the most important aspect of things. Taking the speculative position that wholes are made up of simple parts, and regarding the units reached by numerical analysis as the proper units, he held that things are made of numbers (i.e. not of abstract numbers, but of simple units, as a line is made up of points). The fact that mathematical analysis, as in the successive bisection of a line, never gives an absolute unit, made possible the celebrated criticisms of Zeno, the Eleatic, upon pluralistic theories. These at once seek to explain the real as made up of simple units, and yet are unable to provide the units. If a line is made up of points, we ought to be able to say 'how many.' But the fact that we can never reach an end of our bisecting proves that we cannot assign any number. Similar criticisms were applied to pluralistic views of time as made up of instants, of which 'Achilles and the Tortoise' is the most famous.

The one *versus* the many—permanence *versus* change—formed the problem of the thinkers mentioned thus far, and usually with a one-sided insistence on one term of the antithesis. Empedocles of Sicily (about 490–430 B.C.), Anaxagoras of Klazomene (about 500–428 B.C.), and the Atomists combined these two terms in their mediating theories. All maintain the permanence of certain elements, and attribute the apparent arising and disappearing of things to rearrangements of these elements. Empedocles named four 'roots' of things—earth, air, fire, and water (selected, perhaps, partly on mythological grounds). Anaxagoras hit upon the standard of modern chemistry, and treated as elements substances which resisted analysis into heterogeneous materials. Later writers termed them ὁμοιομερῆ (homogeneous particles). The Atomists conceived their permanent elements more abstractly as Atoms (q.v.), which they regarded as differing only in shape and arrangement—quantitative as contrasted with qualitative difference. The atoms were therefore each like the One of Parmenides, in that they were conceived as filling space, but, in addition to the atoms, the school postulated also the 'existence' of the void, of 'what is not.' To explain the rearrangements of elements, which cause changes in things, Empedocles and Anaxagoras introduced auxiliary elements which did the work of forces, although not considered as purely abstract forces. These were, for Empedocles, love and strife. The survival of the combinations produced was decided in his view

by natural selection, while his conception of the cosmical process is quite similar to modern evolutionary theories in general outline. The combining and disposing element for Anaxagoras was the NOUS (q.v.), which ordered things intelligently, although it was not conceived as mind (distinct from matter) in a modern sense. Leucippus did not introduce another element, but supposed the atoms to be always in motion, and the various worlds to be the complex structures formed by atoms impinging upon each other. A mechanical theory of natural processes thus reached a clear formulation, and was developed in the hands of Democritus (who properly belongs to a later period) to a comprehensive system of MATERIALISM (q. v.).

For views of the soul in these earlier thinkers see PSYCHE. The problem of knowledge was not made the direct object of inquiry, and yet the discrepancy between theoretical conceptions and common opinion forced several thinkers to note the distinction between reflection and sense perception. The usual solution was to charge the senses with deception. Heraclitus based the charge on the fact that the senses find permanence in objects; Parmenides, on the ground that they report change.

The Sophists represent a shifting of the centre of interest and study from the cosmos to man, and an emergence of science from closed schools or societies into public discussion. The growing democracy made knowledge valuable to the citizen as well as to the scholar. Teachers of every subject, and especially teachers of rhetoric, found eager hearers. The study of the art of persuasion, especially upon political themes, led naturally to the study of politics itself. This was favoured also by the decay of older religious beliefs, and the series of political upheavals in which laws and justice seemed to become the sport of despots. The same problem as to the φύσις (the primal nature or essence) is raised again. But this time it is the 'nature' of justice and institutions, not of the cosmos. And as in the former period, so now, it is a process of transition from the older religious ideas and controls. The older Sophists—Hippias, Protagoras, Gorgias—are not represented by Plato as holding radical views on these questions. Younger Sophists are, however, depicted as maintaining that 'might is right,' or that laws are merely the invention of the 'many weak' against the 'natural law.' Individualism is thus the prevailing note, and this found expression in the saying attributed to Protagoras, 'Man is the measure of all things,' which is the classic formulation for the doctrine of RELATIVISM (q.v.). It is not known that Protagoras himself applied his principle to ethics. He developed it rather with reference to sense perception. He affirms that all knowledge is perception, and that all perception is based on a twofold motion—motion from the thing, and motion from the percipient organ—which forms a peculiar product that is neither the thing itself nor the organ itself, but a joint product different from either of its sources. He infers that what we perceive is an appearance and not the thing. See PHENOMENALISM, and SUBJECTIVISM.

Whether Democritus of Abdera, the city of Protagoras, was directly stimulated to his theory of knowledge by Protagoras (see Brochard, in *Arch. f. Gesch. d. Philos.*, ii. 368; Windelband, *Hist. Philos.*), he at least made a distinction between 'true' knowledge and that which is not genuine, and a corresponding distinction between the subjective character (νόμῳ) of perception, on the one hand, and the real existence of atoms and the void (ἐτεῇ) on the other. Perception yields phenomena; rational thought (λόγος) gives things as they are in truth. This same principle determines the ethical principle of Democritus. No φύσις or permanent reality can be found in bodily pleasures. True happiness is found rather in repose and quiet that wait on knowledge.

Literature: J. BURNET, Early Greek Philos. (1892); ZELLER, Pre-Socratic Philos. (1881); GOMPERZ, Greek Thinkers (1901); WINDELBAND, Hist. of Ancient Philos. (1899); BENN, The Greek Philosophers (1883), and The Philos. of Greece (1898); FAIRBANKS, The First Philosophers of Greece (1898); RITTER and PRELLER, Historia Philosophiae Graeco-Romanae (8th ed., 1898); TANNERY, Pour l'Hist. de la Sci. Hellène (1887); BYK, Die vorsokratische Philos. d. Griechen (1875–7); BENDER, Die Entstehung d. Weltanschauungen im griechischen Alterthum (1899); ROHDE, Psyche (2nd ed., 1897); CHAIGNET, Hist. de la Psychol. d. Grecs (1887–93); SIEBECK, Gesch. d. Psychol. (1880–4); MABILLEAU, Hist. de la Philos. atomistique (1895); NATORP, Forsch. z. Gesch. d. Erkenntnissproblems (1884); SCHMIDT, Ethik d. alten Griechen (1882); GROTE, Hist. of Greece, chap. viii; CHIAPELLI, Per Storia dei Sofisti, Arch. f. Gesch. d. Philos., ii;

Histories of Philosophy by Ueberweg-Heinze, Windelband, Erdmann (the former give bibliographies). For recent literature see the 'Berichte' in the Arch. f. syst. Philosophie. (J.H.T.)

Pressure Sensation [Lat. *pressura*, a burden]: Ger. *Druckempfindung*; Fr. *sensation de pression*; Ital. *sensazione di pressione* (or *barica*). A sensation obtainable (1) from the 'pressure spots' of skin and mucous membrane, (2) from striped muscle, and possibly (3) from joints. Cf. Articular Sensation.

Pressure and pain are perhaps the oldest sense-processes in kind. On its intensive side, cutaneous pressure follows Weber's law. Both the cutaneous pressure and the articular sensation are endowed with the attribute of extent, and possess local signature.

The following points may be noticed:—(1) Pressure stimuli give rise, under favourable conditions, to two sensations, the primary and the secondary pressure. The explanation has been sought in a double conduction by the spinal cord, and in the existence of centrifugal fibres of the sensory nerves. (2) There is a close interrelation of the senses of pressure and temperature: cold and hot bodies are heavier than bodies of equal weight at a neutral temperature. (3) Under certain conditions—constancy of articular and inconstancy of cutaneous stimulation—there is an outward reference of sensation, e. g. to the tip of the stick held in the hand. Cf. Haptics.

Literature: Funke, in Hermann's Handb. d. Psychol., III. ii. 316; Weber, Tastsinn u. Gemeingefühl (1834); Sanford, Course in Exper. Psychol., expts. 1–12, 21–30; Henri, Raumwahrnehmung d. Tastsinnes (1898); v. Frey, Untersuchungen ü. d. Sinnesfunktion d. menschlichen Haut, and in Ber. d. k. sächs. Gesell. d. Wiss., xxiii. 3 (1896); Dessoir, Du Bois-Raymond's Arch. (1892). (E.B.T.)

Pressure Spot: Ger. *Druckpunkt*; Fr. *point de pression*; Ital. *punto di pressione* (*punti barici*). A spot of the skin evincing peculiar sensitiveness to stimulations of passively supported weight. See Pressure Sensation, and Weight Sensation. Cf. the remarks made under Temperature Spot on the use of the word 'spot' (in preference to 'point').

Literature: M. Blix, Zeitsch. f. Biol., xx (1884); A. Goldscheider, Du Bois-Raymond's Arch. (1885), 340; v. Frey, as cited under Pressure Sensation (q. v.). (E.B.T.)

Presumption [Lat. *praesumptio*, used by Quinctilian to translate Gr. *πρόληψις*, anticipation, from *prae* + *sumere*, to take]: Ger. *Vermuthung*, *präsumiren* (vb.), *Voraussetzung* (in logic); Fr. *présomption*; Ital. *presunzione*. (1) In logic: a more or less reasonable hypothesis, supported, it may be, by circumstances amounting all but to proof, or, it may be, all but baseless.

Logical or philosophical presumption is non-deductive probable inference which involves a hypothesis. It might very advantageously replace hypothesis in the sense of something supposed to be true because of certain facts which it would account for. See Probable Inference (3). (C.S.P.)

(2) In psychology: the disposition towards acceptance or Belief (q. v.), which anticipates the complete resolution of doubt.

Theories of belief have not taken sufficient account of the transition states of mind between belief and disbelief, or between belief and Reality Feeling (q. v.). The psychology of more or less doubt is reflected in the logical discussions of presumption and hypothesis. (J.M.B.)

Presumption (in law) [Lat. *praesumptio iuris*]: Ger. *Vermuthung*; Fr. *présomption*; Ital. *presunzione*. That which may be assumed without proof or taken for granted, e. g. a man charged with crime is presumed to be innocent until he has been proved to be guilty.

Presumptions are either of law or of fact. A *presumption of fact* is an inference drawn by a trier of a question of fact of the existence of one fact from the existence of others, and may be overthrown by proof to the contrary. A *presumption of law* is one which the law draws as the result of human reason and experience. It is a *rebuttable presumption* when it can be overthrown by evidence to the contrary, a *conclusive presumption* (*praesumptio iuris et de iure*) when it cannot be. 'In its origin, every presumption is one of fact and not of law. It may, in course of time, become a presumption of law, and even an indisputable one. Its truth may be so universally accepted as to elevate it to the position of a maxim of jurisprudence. Its convenience, as a rule of decision, may be so generally recognized as to place it in the rank of legal fictions. But so long as it retains its original character as a presumption of fact, it has simply the force of an argument' (Ward *v.* Metropolitan Life Insurance Co., 66 Conn. Law Reports, 227; 1 Greenleaf on Evidence, § 44; Stephen, *Digest of the Law of Evidence*, 246). A legal presumption is not strictly evidence (Lisbon *v.* Lyman, 49

New Hampshire Law Reports, 553). The main office of a presumption, in the trial of a cause, is to fix the duty of going forward with argument or evidence on a given question. See article on the Presumption of Innocence in Criminal Cases, by Jas. B. Thayer, in the *Yale Law Journal*, vi. 185; and chap. viii, on Presumptions, of his *Preliminary Treatise on Evidence at the Common Law* (Boston, 1898).

In a looser sense legal presumptions are termed matter of evidence (United States *v.* Coffin, 156 United States Law Reports, 432). But they are really substitutes for evidence, and in themselves have properly no probative quality, being merely the assertion of legal rules or conclusions.

The Roman law made large use of presumptions in the trial of causes (see *Dig.*, xxii. 3, *de Probationibus et Praesumptionibus*).

Literature: French Code civil, Liv. iii. tit. 3, § 3; and the German Civilprozessordnung, § 259; art. on Presumptions of Law and Presumptive Evidence, Law Mag., vi. 348; MENOCHIUS, De Praesumptionibus, &c.; BEST, Presumptions. (S.E.B.)

Presumptive Inference: see PROBABLE INFERENCE (3).

Presupposition [Lat. *prae* + *suppositus*, placed under]: Ger. *Voraussetzung*; Fr. *présupposition* (a coined word); Ital. *presupposto*. Presupposition is either a conjecture or what is better called in English a POSTULATE (q. v.).

As a philosophical term it translates the German Voraussetzung, and is presumably preferred to 'postulate' by Germans and others imperfectly acquainted with the English language, because they suppose that postulate in English has the same meaning as Postulat in German, which is not true; for the English retains the old meaning, while the German has generally adopted the conception of Wolff. If postulate does not exactly translate German Voraussetzung, it comes, at any rate, quite as near to doing so as presupposition; a good translation would be 'assumption.' (C.S.P.)

Pretence: see SEMBLANCE, LIE, EQUIVOCATION, and MAKE-BELIEVE (1).

Preterition [Lat. *praeteritio*, a passing over]: Ger. *Übergehung*; Fr. *prétérition*; Ital. *preterizione*. In Calvinistic theology, the doctrine that in foreordination God, having in the exercise of his sovereign pleasure elected some to eternal life, passed over the rest and ordained them to eternal death for their sins.

The theory of limited atonement was first clearly enunciated by Augustine, who taught that while God decrees the salvation of the elect without reference to anything in themselves, he decrees the perdition of the non-elect on account of their sins; the decree of preterition differs from that of election to life in that the sinfulness of the lost is a condition of the decree of their condemnation.

Literature: see FOREORDINATION. (A.T.O.)

Preternatural [Lat. *praeter*, beyond, + *natura*, nature]: Ger. *aussernatürlich*; Fr. *contre nature, surnaturel*; Ital. *preternaturale*. Transcending ordinary natural agencies, whether regarded as supernatural or not. (A.T.O.)

Prevarication: Ger. *Verdrehung*; Fr. *prévarication*; Ital. *prevaricazione*. Cf. EQUIVOCATION, LIE, and VERACITY. A general term for verbal deception, often of a quasi-logical sort. (J.M.B.)

Prévost, Pierre. (1751–1839.) Born and educated under Le Sage, a disciple of Newton, at Geneva, he travelled in Holland and England, and lived in Paris. Succeeded Sulzer in the Berlin Academy; professor of literature at Geneva, 1784; professor of philosophy there, 1793. He may be regarded as an adherent of the Scottish philosophy.

Preyer, William Terrey Thierry William. (1841–98.) Born at Manchester, he was educated there and at London, Duisburg, Bonn, Berlin, Heidelberg, Vienna, and Paris. Privatdocent at Bonn, 1865; professor of physiology at Jena, 1869; Privatdocent at Berlin, 1888. Afterwards he lived privately at Wiesbaden, where he died.

Price [OF. *preis*, Lat. *pretium*]: Ger. *Preis*; Fr. *prix*; Ital. *prezzo*. (1) The quantity of one article which is exchanged for another. (2) The quantity of money for which an article can be exchanged.

Under a system of BARTER (q.v.), either of the articles exchanged may be regarded as the price of the other. Under the modern commercial system one of the parties to the exchange almost always gives money or a right to receive money; and the term price is practically confined to sums of money thus transferred.

Smith, followed by a number of writers in the early part of the nineteenth century, said that the *real price* of anything was the toil and trouble of acquiring it; but it is now customary to use the word COST (q. v.) rather than price to convey this idea.

For the distinction between MARKET PRICE and NORMAL PRICE see those topics; cf. also SUPPLY AND DEMAND. (A.T.H.)

Price, Richard. (1723–91.) Born at Tynton, Wales, he was educated at Talgarth and in London. He became a Presbyterian minister; was chaplain at Stoke Newington, 1743–56, and pastor of churches in Hackney and Newington Green until his death. He wrote in theology, ethics, economics, and politics.

Pride [AS. *pryd*]: Ger. *Stolz, Eitelkeit* (vanity); Fr. *fierté, orgueil, vanité* (vanity); Ital. *orgoglio, vanità* (vanity). A sentiment having the self for its object, involving: (1) a certain fixed preconception concerning one's own qualities, actions, powers, social states, place in the estimation of others, &c. (2) Satisfaction, more or less keen, in contemplating oneself as conforming to this preconception. Whatever ministers to this satisfaction in a conspicuous way, we are said to be proud of. (3) Grief or resentment when anything occurs to disturb the preconception.

The preconception of the self which is implied in pride when exaggerated is called conceit. When it manifests itself in such a way as to provoke resentment or ridicule in others, it is termed presumption or arrogance, and, in smaller matters, egotism.

But conceit is not confined to pride; it is also found in the sentiment of vanity. What distinguishes vanity from pride is the tendency in vanity to show off. The conceit of the vain person requires for its sustenance explicit reference to the applause, admiration, or envy of others. It is wounded or disturbed when such overt recognition is withheld. The proud person who is conceited takes his own estimate of himself, including his preconception of the attitude of others towards him, as a matter of course. He may resent expressions of admiration or applause, just because they imply that his excellences are not taken for granted, but are regarded with surprise. Or he may think so highly of himself in comparison with others as to resent the suggestion that what they think or do can make any difference to him. If he accepts tributes of admiration, he accepts them merely as unchallenged right, and without elation. In vanity, on the contrary, there is a continual appeal to others for recognition, for without express recognition self-conceit is hesitating and insecure. The frog in the fable who tried to swell himself into an ox is a typical example of vanity; the hero of the *Bride of Lammermoor* is a typical example of pride.

It should be noted that pride, unlike vanity, does not involve belief in one's own superiority to others. The most deeply rooted pride may be connected merely with the conception of independence or equality, and may be manifested mainly by a refusal to accept favours or to be under obligation. (G.F.S.–J.M.B.)

Spinoza defines pride as 'thinking too much of ourselves, through self-love.' 'As overestimation is an effect or property of love, so pride is an effect or property of self-love' (Def. 28 of the affections, *Ethics*, Pt. III. Prop. 59). Mandeville held that 'the moral virtues are the political offspring which flattery begot upon pride.' Even in man's 'more refined notions of virtue,' he insists, 'we may discover no small symptoms of pride; and the humblest man alive must confess that the reward of a virtuous action, which is the satisfaction that ensues upon it, consists in a certain pleasure he procures to himself by contemplation on his own worth; which pleasure, together with the occasion of it, are as certain signs of pride as looking pale and trembling at any imminent danger are the symptoms of fear' (*Enquiry into the Origin of Moral Virtue*).

Kant includes all inclinations and desires in the single term 'self-regard': 'This is either the self-love that consists in an excessive fondness for oneself (*philautia*), or satisfaction with oneself (*arrogantia*). The former is called particularly selfishness, the latter self-conceit. Pure practical reason checks selfishness [converting it into rational self-love]. . . . But self-conceit reason strikes down altogether, since all claims to self-esteem which precede agreement with the moral law are vain and unjustifiable': respect for the moral law means the humiliation of self-conceit (*Critique of Practical Reason*, 197; Eng. trans., Abbott, 165). Kant's view is an extreme statement of the Christian estimate of pride, which, as the opposite of the virtue of humility, was condemned by mediaeval moralists as a deadly sin. 'Pride,' says Thomas Aquinas, 'is opposed to humility, and humility properly regards the subjection of man to God: hence, contrariwise, pride properly regards the want of this subjection, in that one lifts himself up above the limit prefixed for him according to the divine rule or measure. . . . The root of pride is taken to be in this, that a man somehow is not subject to God and to the rule of his guidance.' It follows that pride is a mortal sin; still, 'some movements of pride are only venial sins, while reason consents not to them. . . . Pride is of its kind the most grievous of sins, because it exceeds them all in that turning away from God, which is the formal and

crowning constituent of sin' (*Summa*, II. ii. qu. 162, arts. 5, 6; Eng. trans. by Rickaby, *Aquinas Ethicus*, ii. 365–7). (J.S.)

Literature: many of the textbooks of psychology, and the literature of EMOTION (q.v.). See also BIBLIOG. G, 2, *e*.

Priest [Gr. *πρεσβύτερος*, elder]: Ger. *Priester*; Fr. *prêtre*; Ital. *prete*. The authorized representative of a deity, who mediates between the deity and the worshipper, conveying the latter's offering and sacrifices to the deity and communicating the will of the deity to the worshipper.

The term priest is sometimes applied to any minister of religion. But, strictly speaking, the distinctive functions of the priestly office are mediation and sacrifice. The priest is to be distinguished from the prophet, who is an inspired revealer and organ of new truth. The priest belongs to a prescribed order, in accordance with which his ministry is exercised. In the Christian scheme, Jesus Christ is the great High Priest, who once for all offered himself as a mediatorial sacrifice for his people.

Literature: KÜPER, Das Priesterthum des alten Bundes; MANNING, The Eternal Priesthood (1883); PROBST, Sacramenta u. Sacramentalien. (A.T.O.)

Priestley, Joseph. (1733–1804.) Born near Leeds, he was educated at Daventry. Ordained 1755, in an Independent congregation at Needham Market, Suffolk; resigned 1758, because of a change in his views towards Unitarianism; taught in Warrington Academy, 1761–7, where he became acquainted with Richard Price and Franklin; received the degree of LL.D. from Edinburgh, and became fellow of the Royal Society, 1767; librarian and literary companion to the Earl of Shelburne, 1773–80; pastor of Unitarian congregations at Birmingham, 1780–91, and at Hackney, 1791–4. In 1794 he moved to the United States, settling at Northumberland, Pa. See MATERIALISM.

Primacy and **Primitive**: see PRIMARY.

Primary and Secondary Qualities: see QUALITY AND QUALE.

Primary (1), **Primitive** (2), **Primordial** (3) [Lat. *primus*, first, + *ordo*, rank]: Ger. (1) *erst, ursprünglich*, (2) *primitiv*, (3) *ursprünglich*; Fr. (1) *primaire*, (2) *primitif*, (3) *primordial*; Ital. (1) *primario*, (2) *primitivo*, (3) *primordiale* (the distinctions are not exact in any of the languages). These terms all relate to value or to elements, and characterize their original, underived character. The two meanings of early in time and first in rank are generally more or less blended. The idea of first in rank, because first in time and so fundamental, is uppermost in primary; it is used to emphasize what is not secondary or subsidiary in importance—as primary truths. Primitive refers rather to time, and may be used as a depreciatory term, connoting the undeveloped and crude character of what comes first. Primordial has an elemental significance; it denotes the original factors or forces out of which later development has proceeded. Among the Neo-Platonists it referred especially to the germinal, vital power of the original constituents. Cf. ORIGINAL (1). (J.D.)

Kant applies the terms primate and primacy (Primat) to that which is logically or rationally (durch Vernunft verbunden) primary in relation to what is secondary or derived (*Krit. d. prakt. Vernunft*, 144, 146). (J.M.B.)

Primary Attention: see ATTENTION.

Primary Memory: see ORGANIC MEMORY.

Primary Position: Ger. *Primärstellung*; Fr. *position primaire*; Ital *posizione primitiva*. (1) A position from which the lines of sight may move without torsion of the eyeballs.

It is the position which the eyes assume when the head and body are erect and the eyes directed forward upon a distant horizon. The lines of sight are parallel, and their plane depressed a little below the horizontal—probably in accordance with the level of insertion of the rectus ext. and rectus int. muscles. The position is not absolutely constant for different individuals, or even for the same person at different times; it is most easily determined by the after-image method.

Literature: WUNDT, Physiol. Psychol. (4th ed.), ii. 114, 116; HELMHOLTZ, Physiol. Optik (2nd ed.), 619, &c.; SANFORD, Course in Exper. Psychol., expt. 131.

(2) The 'primary position for convergence' is that depressed position of the plane of regard in which convergence is possible without rotation of the eyes about the lines of regard.

Literature: SANFORD, Course in Exper. Psychol., expt. 133; HELMHOLTZ, Physiol. Optik (2nd ed.), 626. (E.B.T.)

Primary Truth: see PRIMARY, FUNDAMENTAL TRUTH, and ULTIMATE.

Primates [Lat. *primus*, first]; Ger. *Primaten*; Fr. *primates*; Ital. *primati*. The first or highest order of mammals.

The primates include the lemurs, monkeys, apes, and man. They are characterized by five digits, of which one is opposable to the

others, making a prehensile hand or foot (the digits are generally provided with flat nails); the orbit is completely bony; the clavicles are well developed; the femur never has a third trochanter; the stomach is simple; the testes descend into the scrotum; there are two thoracic mammae. Cf. ANTHROPOID.

Literature: CLAUS, Zoologie; BREHM, Thierleben; HARTMANN, The Anthropoid Apes; HUXLEY, Man's Place in Nature; FLOWER and LYDDEKER, Mammals Living and Extinct; HAECKEL, Generelle Morphologie. (C.S.M.)

Prime [Lat. *primus*, first]: Ger. *erst*, *ur-* (in compounds, as *Ursache*); Fr. *prime*, *premier*; Ital. *primo* (general). First: e.g. (1) First in order of causation, as 'prime motor.'

(2) First in order of development and complexity; elementary; as 'prime number.'

(3) In exact logic, a 'prime aggregant' is an aggregant not separable (without further information) into aggregants; so also 'prime component' (called also, but inappropriately, a 'prime factor'). (C.S.P.)

Prime (in acoustics): Ger. *Grundton*; Fr. *son fondamental*; Ital. *suono fondamentale*. See FUNDAMENTAL TONE.

Primitive: see PRIMARY.

Primitive Credulity: see BELIEF.

Primordial: see PRIMARY.

Primum cognitum [Lat.]. A topic of the most obsolete psychology. The question was what was the earliest form of intellectual conception in the development of a child, not of a clear and distinct kind, but yet not mere perception or imagination, nor yet the earliest concrete judgment, but, as they said, 'simple apprehension of things.'

Literature: AQUINAS, Summa Theol., pars I. qu. 85, art. 3; AEGIDIUS ROMANUS, in I. Phys., cap. ii. qu. 4; SCOTUS, Quodlibet, 2, and Opus Oxon., I. iii. 2; Conimbricenses, in I. Phys., cap. v. qu. 4; ZABARELLA, De Ord. Intell., passim. (C.S.P.)

Primum mobile [Lat.]. In the Aristotelian system, the physical system which is next to God, the unmoved mover. Cf. MOTION.

Motion is a sign of change and so of imperfection; but the first mover as next in rank to God has a movement which continually returns into itself, and thus affords a symbol of permanence. Its movement is circular and recurrent. Thus the diurnal revolution of the heavens was accounted for. The idea was taken up and developed in the Ptolemaic system, the primum mobile being the tenth and uttermost concentric sphere, which in its daily revolution takes all the fixed stars with it. (J.D.)

Principal [Lat. *principalis*, from *princeps*, chief]: Ger. *Haupt-* (in compounds, as *Hauptergebniss*), *Principal-* (in compounds, as *Principalcoordination*, Avenarius); Fr. *principal*; Ital. *principale*. Chief. *Principal cause* is that which by its own virtue produces the effect. *Less principal cause* is one which aids the principal cause but is always unequal to producing the effect. The less principal cause is procatarctic or instrumental.

Principal end: the end which an agent first and primarily intends. It must not be mistaken for the ultimate or remote end.

Principal form is the form which *per se* constitutes a species. It is always a substantial form.

Principal part: any part the removal of which involves the destruction of the whole organism of which it is a part. (C.S.P.)

Principal (in law): Ger. (1) *Vollmachtgeber*, (2) *Hauptschuldner*, (3) *Hauptverbrecher*; Fr. (1) *mandant*, (2) *débiteur principal*, (3) *auteur*; Ital. (1) *mandante*, (2) *debitore principale*, (3) *correo principale*. (1) One for whom another is agent. See AGENCY (in law).

(2) One for whom another is surety.

(3) He who is the chief wrongdoer in a criminal transaction, as distinguished from an accomplice or accessory. (S.E.B.)

Principle [Lat. *principium*, commencement, beginning: trans. of Gr. *ἀρχή*, beginning, authority]: Ger. *Princip*; Fr. *principe*; Ital. *principio*. As the etymology suggests, the term principle has (or had) a double sense: chronological and normative (for a similar connection see PRIMARY). Literally, it means the first in time. But this may be taken as expressing the fundamental absolute reality, from which everything else is derived, and with reference to which all else is secondary and subsidiary. The chronological sense has almost disappeared in modern use, so that principle has come to mean the logical, or metaphysical, basis or ground of other truths. (1) Logically, the principle is a proposition upon which conclusions depend for their validity, and which, if conceded, establishes their truth: opposed to consequence.

(2) Scientifically, it is the law through which a diversity of facts, otherwise unrelated and unexplained, are classified and interpreted: opposed to datum, brute fact, or 'mere' fact.

(3) Practically or morally, it is the law which controls the factors of conduct: opposed

to pleasure or interest as the immediate, or individual, spring of action.

(4) Metaphysically, it is that which determines orders of fact or truth; which possesses superior and primary reality. While in the three previous senses the term principle has a regulative or normative sense, metaphysically this meaning is combined with the older sense of constitutive objective reality. The metaphysical principle includes the three notions of element, cause, and regulating law.

Greek philosophy began with the search after the principle in the literal sense: that original reality (*a*) from which other things are derived, and (*b*) out of which they consist. In the sense (*a*) it was implicitly or explicitly dynamic, a force, a causal power; in the sense (*b*) it was static, an element of subsistence. The first meaning led up to Aristotle's form (εἶδος) as a principle; the second to his matter (ὕλη). Modern thought, with its clearer distinction of subject and object, has tended to differentiate the notions of element, cause, force, and law, with the results stated above. The term 'first principles' is used technically to express primary intuitions, truths to which assent must be given without any further reason or ground. (J.D.)

Principle (in phrases): see AGREEMENT, DIVISION (in logic), Individuation under INDIVIDUAL, SUFFICIENT REASON, Döppler's principle under HEARING (Sound), various logical principles, as e. g. ECONOMY, and Homogeneity under SCIENTIFIC METHOD.

Priority (with **Prior** and **Prius**) [Lat. *prior*, earlier; *prius*, first]: Ger. *Priorität*; Fr. *priorité*; Ital. *priorità*. These words are used in about a dozen different senses in philosophy, although only five are specially recognized. They are enumerated in the mnemonic verses,

> Tempore, Natura, prius Ordine, dic et Honore,
> Effecto Causam dicimus esse prius.

(1) *Priority in time* is considered by Kant to be dependent upon the peculiar constitution of the internal sense (though he does not attempt any inquiry into the constitution further than that it places objects in time). Now, so far as effects in the outer world are due to forces, it seems to be proved that they follow the law of energy. In that case, though connection and continuity in time are important, yet the flow of time one way rather than in the reverse way is unmeaning. There is no effect that follows after its cause. Cf., however, CAUSE AND EFFECT, and see TIME. The law of energy amounts to this, that the instantaneous accelerations of the motions of particles depend solely upon the relative positions of those particles at that same instant; and what follows after depends upon what now is, in the same way precisely, and is calculated by the same laws, as what went before depends upon what now is. Thus, in respect to the direction of its flow, time seems to be, if not purely a psychological affair, at any rate not purely a dynamical affair. Those physical phenomena which proceed in one direction and not in the reverse direction, and which seem to be well explained, such as the viscosity, diffusion, and conduction of gases, may all be explained by principles of probability.

From the point of view of causality exercised by our ideas and upon our ideas, the relations of *prius* and *posterius* present a different problem. Our wishes and endeavours cannot change the past in the least degree; and the future cannot affect our senses. The past affects the senses, and more and more strongly the nearer it is; our will can affect the future, and more and more strongly the nearer it is. The consequence is that the whole procedure of investigating the past and the future is different from the problem as regards real time.

This kind of priority is divided by the schoolmen into priority *quoad existentiam* and *quoad generationem* (that is, the older of two is the prior).

(2) In a meaning allied to temporal priority, Aristotle sometimes speaks of sense as *prior* to reason.

(3) That which is at an earlier stage of development is also called prior to that which is more matured; boyhood is said by Aristotle to be prior to manhood.

(4) So matter is prior to form; and potency to energy.

(5) The simple is prior to the complex; as a point to a line, a line to a surface, a surface to a solid.

(6) The rudimentary is prior to the recondite in order of exposition.

(7) In order of arrangement, the thing reached sooner is prior to that reached later.

(8) The relatively independent is prior to the relatively dependent, as substance to accident, and parts to whole.

(9) That caused thing which is nearer the cause, in any of the four senses of cause, is prior to that which is further from the cause.

(10) That is 'prior in illation' from which

the posterior follows as a rational consequence.

(11) The more general is prior to the more special.

(12) That which is more honourable or higher in rank or dignity is prior to that which is less so.

Prius natura, as practically used by Aristotle, seems often to convey no clear notion. But he certainly calls the *prius dignitate* and *prius causalitate* both *prius natura*. The usage of the Aristotelians is to call that *prius natura* which is prior in consecution or in causality. That is prior in consecution which is such that if something else is supposed it is supposed, but which being supposed something else is not thereby supposed. Thus, if two are supposed, one is supposed; but one being supposed, two is not thereby supposed. Hence, one is prior to two. *Prius causalitate* is either *prius natura generantis* or *prius natura intendente*. *Prius natura generantis* is the priority of the simple to the complex, as of the parts to the whole; *prius natura intendente* is the priority of the perfect to the imperfect, as of the whole to the parts. But this hardly seems to agree with Aristotle (646 a 25). *Prius nobis* (*πρὸς ἡμᾶς πρότερον*) is what is prior in the order of learning, or more easily known. (C.S.P.)

Privacy: see PUBLIC AND PRIVATE.

Private [Lat. *privatus*, not public, from *privus*, single]: Ger. *privat* (the occasional use of *geheim* is significant of the early identification of *private* and family concerns); Fr. *privé*, *particulier*; Ital. *privato*. (1) Strictly pertaining to (*a*) a single individual (e. g. a private life), or (*b*) a group of individuals (e. g. a private company).

(2) A person who holds no public office or military commission is a private person, soldier, &c. Cf. PUBLIC AND PRIVATE. (F.H.G.–J.M.B.)

The conception of (1) private affairs, and (2) a private person, is extremely dim in tribal communities, and becomes quite distinct only in high civilizations. PUBLIC (q. v.) and private are fully differentiated only when civic organization has arisen. Distinction (2) antedates the oldest written decisions of English common law. 'Any private person (and *a fortiori* a peace officer) that is present when any felony is committed is bound by the law to arrest the felon, on pain of fine and imprisonment, if he escapes through the negligence of the standers by' (Blackstone, *Commentaries*, Bk. IV. chap. xxi). (F.H.G.)

Private Law [Lat. *ius privatum*]: Ger. *Privatrecht*; Fr. *droit privé*; Ital. *diritto privato*. That part of law which looks mainly to individual interests and relations, as distinguished from public law, which looks merely to public interests and relations.

The line of demarcation cannot be precisely drawn. In the pursuit of remedies provided by private law, the state is never an actor, unless for the protection of rights of individuals, or of rights of its own not directly flowing from its sovereign character. Proceedings of the class last mentioned are sometimes classed under the remedies of public law (see Holland, *Jurisprudence*, chap. xvi. 330; Pollock, *Jurisprudence*, chap. iv. 94). Private law comprehends the law of private property and obligations, including succession, the domestic relations, and, in a certain sense, civil procedure.

'Publicum ius est quod ad statum rei Romanae spectat: privatum quod ad singulorum utilitatem' (*Inst. of Just.*, i. 1, *de iustitia et iure*, 4). (S.E.B.)

Privation [Lat. *privatio*, trans. of Gr. *στέρησις*]: Ger. *Beraubung*; Fr. *privation*; Ital. *privazione*. The negation or absence of what is natural or customary, i.e. of habit.

Thus, blindness is privation of sight. See Aristotle's *Praedicamenta*, chap. x; also *Met.*, I (the book *περὶ μονάδος*), iv. 1055 b 2, and Δ. xxii. (C.S.P.)

Aristotle especially attributes privation to matter (*ὕλη*) conceived as if lacking form (*εἶδος*) (*Met.*, 1055 b 13). To the scholastics evil is the privation of good. Cf. Eisler, *Wörterb. d. philos. Begriffe*, 'Beraubung,' 'Privation.'

The adjective form privative (Gr. *στερητικός*) denotes, as in privative PROPOSITION (q. v.), the presence of privation. (J.M.B.)

Privative: see PRIVATION.

Privilege (in law) [Lat. *privilegium*]: Ger. *Vorrecht*, *Privilegium*; Fr. *privilège*; Ital. *privilegio*. (1) A beneficial faculty or immunity conferred by a state upon one or more persons.

(2) As used by civilians, an implied hypothecation of a person's property, given by law to secure his obligations. See the French *Code Civil*, Liv. III. Tit. 18.

Breach of privilege: a violation of the privileges belonging to a legislative body or its members. Question of privilege: a question raised in such a body, touching its privileges or those of any of its members.

In ancient Rome a *privilegium* was a law specially directed against an individual.

answering to our Act of Attainder. The Twelve Tables forbade such legislation. In post-Augustan Latin the term has its present signification. In free governments the principle of equality of rights or constitutional provisions often secure to all what in other times or countries would be known as special privileges of particular individuals, e. g. the privilege of the writ of habeas corpus. (S.E.B.)

Probabilism [Lat. *probabilis*, from *probare*, to prove]: Ger. *Probabilismus*; Fr. *probabilisme*; Ital. *probabilismo*. (1) The casuistical doctrine that any opinion held by a recognized doctor of the Church must be regarded as probably correct, and may therefore be safely followed by a layman, who cannot be expected to decide where doctors differ.

This doctrine is a logical outcome of Casuistry (q.v.). It was first stated by the Spanish monk Molina (1528–81), and was afterwards utilized more especially by Jesuit confessors. The bearings of this doctrine upon the moral life were incisively exposed by Pascal in his *Lettres écrites à un provincial* (1656).

(2) The term probabilism is also used to describe the theory which mediates between a sceptical view regarding knowledge, and the needs of practical life.

According to this theory there is no absolutely certain knowledge, but there may be grounds of belief sufficient for practical life. This view was held by the Sceptics of the Academy, especially by Carneades (214–129 B. C.), who distinguished different degrees of belief and of probability. See Windelband, *Hist. of Philos.*, II. i. 17. (W.R.S.)

It is logically related to Pragmatism (q. v.) and to the justification of what is known as Will to Believe (q. v.). (J.M.B.)

Probability [Lat. *probabilis*, likely]: Ger. *Wahrscheinlichkeit*; Fr. *probabilité*; Ital. *probabilità*. (1) Likelihood. That state of a case or a question which results from superior evidence or preponderance of argument on one side, inclining the mind to receive that as the truth, but leaving some room for doubt.

(2) Quantitatively: that character of a proposition of doubtful truth which consists in the frequency with which like propositions are found true in the course of experience; the ratio of the number of favourable cases to the whole number of equally possible cases; the ratio of the number of occurrences of an event to the total number of occasions in the course of experience. This is also called the chance of the event. Thus a chance decidedly greater than $\frac{1}{2}$ is likelihood; decidedly less, improbability or bare possibility; while a chance equal to unity is certainty, and a chance equal to zero is impossibility.

It is usual to distinguish between direct and inverse probability. Thus the direct probability that on the occasion A there shall be the event B is the value towards which tends the ratio of the number of occasions A upon which there is the event B, to the total number of occasions A, as these occasions recur without limit. (Of course, it may be that there is no definite value to which the ratio tends; to such cases the theory does not apply.)

Similarly, the inverse probability that the event B shall have happened upon the occasion A is the value towards which tends the number of happenings of B upon occasions A, to the total number of happenings of B, as these latter recur without limit.

A die is cast. Who shall say whether it is going to turn up ace or not? Of this our ignorance is profound. Yet all will grant that in a large number of throws, unless the die is loaded, ace should turn up about one-sixth of the time. This combination of ignorance and knowledge confronts us in all problems in chance: ignorance as to the special event, knowledge as to what may be expected in the long run.

Consider the following actual results of 200 spins of a coin, H meaning head and T tail.

HHTHT	*THTT*	*TTHTH*	*THHTH*
HTHTH	*HHHTT*	*THHTH*	*TTTTT*
HHHTH	*HHHTH*	*HTHHH*	*TTTTH*
THHHH	*HTHH*	*THTHH*	*HHTHT*
TTHHH	*THTTT*	*THTTT*	*TTHTH*
HTTTH	*HHHTT*	*THHTH*	*THTHT*
HHHHH	*TTTHT*	*TTTTT*	*THTTT*
THTTT	*THHHT*	*HHTHT*	*HTTHH*
HHTHH	*TTTTT*	*HTTHH*	*HTHTT*
HTTTT	*HHHTT*	*THHTH*	*HTHTH*

At first glance all is confusion: the ratio of the number of heads to the whole number of spins runs successively 1, 1, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{3}{5}$, $\frac{2}{3}$, ... almost haphazard. But, continuing the spins, the ratio grows more and more steady, as indicated in Fig. 1. There is a tendency towards the value $\frac{1}{2}$, and the deviation from this value, after the first 70 spins, is constantly slighter. This is a first sign of order. Again, of the 97 times that head occurs, in 43—nearly half the number of times—it is followed by head, as it should be; while of the 103 times that tail appears, it is followed by tail 49 times. Of the 32 possible successions of results for five consecutive spins, nearly

every one occurs several times in the table. In fact, the characteristics of a chance distribution are shown as well as could be expected for so small a number of spins. Were we to keep on for thousands and millions of spins, these characteristics would come out more and more clearly, and we should arrive at a distribution approximating as nearly as we please (so far as *ratio* of occurrences are concerned) to an ideal chance distribution, in which the separate events and any designated successions and combinations of them would occur with frequencies proportional to the respective possibilities of each. The particular succession of 200 spins actually recorded above could be expected but once in $2^{200}(>10^{60})$ trials. Could we make 100 trials per minute for 16 hours daily, 300 days in the year, 3×10^{52} years would not suffice for so many trials.

The phenomena in games of chance had long been noticed by observant gamblers. At last, some one comes to Galileo (1564–1642) and asks him why with three dice 10 is thrown oftener than 9, while yet the number of combinations giving each is the same, namely six. Galileo showed that, if account be taken of the number of ways in which each combination can be obtained, then, of 216 ($=6^3$) possibilities, 25 give 9, while 27 give 10.

But the mathematical theory is usually deemed to have its origin in the correspondence of Pascal and Fermat concerning the 'problem of points,' a problem suggested by a certain Chevalier de Méré: Two players leaving off in the midst of a game, it is proposed to divide the stakes proportionally to their chances of winning were the game continued. The mathematical theory of probability deals, of course, not with the determination of the probability of any simple or unanalysable event, but with the evaluation of the probability of complex events, when the probabilities of the simple events concerned in them are supposed to be given. In solving the 'problem of points,' Pascal made use of

the two fundamental principles of combination upon which the whole science has been built, namely:

I. *The probability that both of two independent events shall happen is the product of their respective probabilities.*

II. *The probability that one or the other of two mutually exclusive events shall happen is the sum of their respective probabilities.*

Thus ace followed by six (with a single die) has a probability $\frac{1}{6}\times\frac{1}{6}, =\frac{1}{36}$; while ace and six, without regard to order, has a probability $\frac{1}{36}+\frac{1}{36}, =\frac{1}{18}$. That 7 ($=6+1, 5+2, 4+3$) shall somehow be thrown has a probability $\frac{3}{18}$.

In the problem of points, let us suppose, as did Pascal, that the players A and B are of equal skill. Then if A lacks two points of winning and B three points, A's chance of winning is precisely the same as that in coin-spinning of getting head twice before tail is got thrice, which again is the same as getting head at least twice in four spins. This is the sum of the probabilities of getting head just two times, just three times, and just four times in four spins. Plainly the number of ways in which head can be got just twice in four spins is simply the number of ways that two things can be taken out of four. A convenient notation for this, in effect suggested by Euler, is $\binom{4}{2}$. The probability of any particular sequence of four spins is $2^{-4} = \frac{1}{16}$. Hence, the probability of one or another of the ways that will give head twice or more is

$$\frac{\binom{4}{2}+\binom{4}{3}+\binom{4}{4}}{16}.$$

This is A's chance of winning; similarly, B's is

$$\frac{\binom{4}{0}+\binom{4}{1}}{16}.$$

Thus the stakes should be divided proportionally to the foregoing numerators.

To calculate the numbers $\binom{n}{k}$ Pascal noticed that the number of ways in which you can take $k+1$ things out of $n+1$ is made up of the number of ways in which you can take $k+1$ things out of n, together with the number of ways in which you can take k things out of n. Then, since all of n things or none of them can be taken each in just one way, the numbers can be got by the scheme known as *Pascal's Arithmetical Triangle.* We reproduce this in symbols to the left, in numerical values to the right:

$\binom{0}{0}\binom{1}{0}\binom{2}{0}\binom{3}{0}\binom{4}{0}\ \dots$	1 1 1 1 1 ...
$\binom{1}{1}\binom{2}{1}\binom{3}{1}\binom{4}{1}\dots$	1 2 3 4 ...
$\binom{2}{2}\binom{3}{2}\binom{4}{2}\ \dots$	1 3 6 ...
$\binom{3}{3}\binom{4}{3}\ \dots$	1 4 ...
$\binom{4}{4}\ \dots$	1 ...
...	...

Each number $\binom{n}{k}$ in the table is the sum of the number above it and the number to the left of it. The numbers $\binom{n}{k}$ for a fixed n all lie on a diagonal called by Pascal a base. In particular, the numbers $\binom{4}{k}$ all lie on the fifth base. Thus A's chance is to B's as 11 to 5.

We can admire the method the more when we remember that the theory of combinations had not then been studied, and that the binomial theorem was yet to be invented.

Roberval had difficulty in accepting Pascal's result, because, in the case under consideration, for example, the game might be decided before four rounds were played. It is quite evident, however, that the playing of the superfluous rounds could in no wise affect the result, so that it is legitimate to suppose them played. Pascal himself fell into the same error in criticizing Fermat's solution for three or more players.

Not long after this the invention of the differential and integral calculus absorbed the attention of mathematicians. In 1657, however, was published Huygens' *De Ratiociniis in Ludo Aleae.* Some fourteen propositions are proved, several of them dealing with *mathematical expectation,* i. e. the sum to be won multiplied by the probability of winning it. The treatise concludes by stating, without proof, the result of five rather difficult problems.

Wallis and Leibnitz write on combinations, but do not make applications to probability; while Halley and others begin to make investigations concerning the laws of mortality, thus laying the foundation for life insurance.

In 1713 appeared James Bernoulli's *Ars Conjectandi,* eight years after the death of the author. The work begins with a reprint of Huygens' treatise, adding the solutions of Huygens' five problems. It then develops very clearly the theory of combinations, making use of substantially Pascal's 'arithmetical triangle.' The binomial theorem for positive integers is proved, and formulae are derived for the sums of powers of the successive integers. The treatise concludes with the proof and some applications of what is known as *Bernoulli's Theorem.*

Consider the chances of ace in throwing a die. The probability that, in a sequence of five throws, a specific three shall be ace, and

the rest not ace, is $\left(\frac{1}{6}\right)^3\left(\frac{5}{6}\right)^2$; so that (since there are $\binom{5}{3}$ ways of selecting the three) the probability of getting exactly three aces in five throws is $\binom{5}{3}\left(\frac{1}{6}\right)^3\left(\frac{5}{6}\right)^2$. The probabilities of 5, 4, 3, 2, 1, 0 aces in five throws are thus given by the terms of the expansion of

$$\left(\frac{1}{6}+\frac{5}{6}\right)^5.$$

More generally, for an event of which the probability upon each of n occasions is p, the probability that the total number of its occurrences shall be n, $n-1$, ... 2, 1, 0 is given by the corresponding term in the expansion of $(p+q)^n$, where $p+q=1$.

Bernoulli proved that, supposing n an integer divisible proportionally to p and q, the greatest term of the expansion would be that containing $p^{pn}q^{qn}$. The proof is substantially that in the ordinary treatises on algebra.

This was a first step. He then showed that, by sufficiently increasing n, the sum of any fixed proportion of all the terms, the fixed proportion being so taken as to immediately precede and follow the maximum term, could be made to bear as large a ratio as one pleased to the sum of all the rest of the terms of the expansion.

Thus, if a coin be spun enough times, the probability may be made as near to unity as we please that the ratio of the number of heads to the whole number of spins will differ from $\frac{1}{2}$ by less than any assigned amount, however small. For instance, by sufficiently increasing the number of spins, we can make the probability against a deviation from $\frac{1}{2}$ by so much as $\frac{1}{100}$ as large as 0·99 or 0·999, or any as near approach to unity as one may name.

If n, p, q have the meanings above assigned, we may, anticipating more modern results, indicate the character of the theorem with greater precision, thus:

It is over 2 to 1 that the number of happenings of the event shall not differ from pn by more than $\sqrt{npq}$; over 19 to 1 that it shall not differ by more than $2\sqrt{npq}$; over 700 to 1 that it shall not differ by more than $3\sqrt{npq}$; over 20,000 to 1 that it shall not differ by more than $4\sqrt{npq}$. Notice that while $\sqrt{npq}$, *the standard deviation*, constantly increases with increasing n, yet $\sqrt{\frac{pq}{n}}$, the ratio of the standard deviation to the number of occasions, as constantly diminishes. Thus, a player at a fair game may expect at last such a run of ill luck as to sweep him off his feet, although all the time the ratio of losses to gains has been more and more nearly approaching unity.

Bernoulli's theorem is of great scientific importance as furnishing a measure of the degree of assurance which we are justified in feeling that the result of increased observation represents the truth with any proposed degree of accuracy (see Laplace's formula, further on).

While Bernoulli's work was lying in manuscript, Montmort and De Moivre published treatises along much the same lines.

Thus, among other matters, Montmort discusses Huygens' problems, solves the problem of points for two players of unequal skill, demonstrates the binomial and multinomial theorems for a positive integral exponent, and shows how to sum series, like the rows of the Pascal triangle, whose differences of a finite order are zero.

De Moivre likewise takes up the Huygens problems, solves the problem of points for any number of players, demonstrates the binomial theorem. But in solving certain problems, he is also led to make valuable investigations into the theory of recurring series. This theory he applies to the problem of the duration of play, that is, the problem of determining the probability that within a certain number of games one or the other of two players shall be ruined. Moreover, he is enabled to add to the precision and power of Bernoulli's theorem by the aid of Stirling's just discovered theorem for approximating to the continued product of the integers from 1 to n, when n is large.

Stirling's theorem asserts that approximately

$$1\cdot 2\cdot 3\ldots n = e^{-n}n^n\sqrt{2\pi n},$$

where $e=2{\cdot}71828\ldots$ and $\pi=3{\cdot}14159\ldots$. For example,

$1\cdot 2\cdot 3\ldots 20 = 2\,432\,902\,008\,176\,640\,000,$

$e^{-20}\,20^{20}\sqrt{40\,\pi}=2\,422\,786\,385\,510\,400\,000.$

The ratio of the two numbers is 1·004 17.

Now,

$$\binom{n}{k}=\frac{1\cdot 2\cdot 3\ldots n}{1\cdot 2\cdot 3\ldots k\cdot 1\cdot 2\cdot 3\ldots(n-k)},$$

and this, by Stirling's theorem, is

$$\frac{n^n}{k^k(n-k)^{n-k}}\sqrt{\frac{n}{2\pi k(n-k)}},$$

an immense simplification when n is large. If k is pn, the expression becomes (putting $1-p=q$)

$$\frac{1}{p^{pn}\,q^{qn}\sqrt{2\pi npq}},$$

involving, as is seen, the 'standard deviation'

$$\sqrt{npq}.$$

De Moivre also makes applications of the probability theory to the calculation of life annuities. Todhunter considers that none other save Laplace has done more for the theory.

Simpson's *The Nature and Laws of Chance* (1740) was practically an abridgment of De Moivre. In 1757, however, Simpson published a collection of tracts, among which is *An Attempt to show the Advantage arising by taking the Mean of a Number of Observations in Practical Astronomy*. Such is the beginning of the modern method for the adjustment of observations.

In 1738 Daniel Bernoulli introduces into the theory of probability the conception of *Moral expectation*. The value to a person of a small increment to his fortune he conceives to vary as the increment directly and as the fortune inversely. Thus a dollar by a person worth a thousand dollars would be valued a thousand times as much as by him who had a million. Putting x for the fortune, dy for the increment in moral value, and letting k be a constant, this gives $dy=\frac{kdx}{x}$; and so the increase in moral value when the fortune increases from a to x is $y-y_0=k\log\frac{x}{a}$. Though in the usual applications of the theory of moral expectation no other law is used, it is evident that there might be others; that indeed to different persons, or to the same person at different times, there would probably be different laws in endless variety. Daniel Bernoulli himself does indeed, to some extent, consider the general case of y any function of x.

Fechner's Law (q. v.) as to the intensity of sensation is precisely Bernoulli's logarithmic law, while the laws of increasing and Diminishing Returns (q. v.) in political economy, with the concomitant notions of marginal utility and disutility, embody his more general conception. Cf. Marginal Increment.

He illustrates his theory by applying it to the *Petersburg Problem* as follows:—

A throws a coin into the air; if head appears at the first throw he is to receive a shilling from *B*, if head does not appear until the second throw he is to receive two shillings, if head does not appear until the third throw he is to receive four shillings, and so on; required the expectation of *A*.

The mathematical expectation is

$$\frac{1}{2}+\frac{2}{2^2}+\frac{4}{2^3}+\frac{8}{2^4}+\ldots\text{ to infinity}$$

$$=\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\ldots\text{ to infinity}=\infty.$$

According to this *A* ought to give an infinite sum for the privilege of playing after this fashion with *B*. Yet who would give as much as £10? The meaning of the solution is that no matter how much *A* may pay, yet, *if* he can keep on playing and paying, at last—it may be next century, next millennium—yet surely at last there will be such a run of luck in favour of *A* as to reimburse him for all his losses.

Daniel Bernoulli's moral expectation for *A*, if the said *A* has a fortune of a shillings at the start, is approximately

$$(a+1)^{\frac{1}{2}}(a+2)^{\frac{1}{4}}(a+3)^{\frac{1}{8}}\ldots-a,$$

which is always finite if a is.

Daniel Bernoulli's chief claim to remembrance, however, in the history of the subject, rests on his introduction of the differential calculus into the theory of probability. He also treats of the adjustment of observations, using the circle as a probability curve. His method, even were it founded on correct principles, is unmanageable in practice.

Euler wrote several memoirs on games of chance and lotteries, and also developed some formulae relative to life insurance.

D'Alembert is noted for his opposition to the theory. Thus, while the theory says that in two throws of a coin the possibilities are four, viz. *HH*, *HT*, *TH*, *TT*, making the probability of head at least once in two throws $\frac{3}{4}$, d'Alembert says that if head comes the first time there is no need of a further throw, so that the possibilities are three, viz. *H*, *TH*, *TT*, and the probability of head is $\frac{2}{3}$. Again, he would count small probabilities zero; he considers that every successive throw of head renders it more likely that the next throw shall be tail; he will not admit that the probability of head is the same when m coins are tossed simultaneously as when one coin is tossed m times in succession; he can even reason that because any event can either happen or not happen its probability is $\frac{1}{2}$.

He merely furnishes some of the many illustrations from the history of the theory that it is one in which it is extremely easy to fall into error; though it is difficult to understand how, upon points so simple and so fundamental, a man like d'Alembert could possibly have gone astray.

There is published in the *Philosophical Transactions of the Royal Society* for 1763 'An Essay towards solving a Problem in the Doctrine of Chances,' by Bayes. The theorem which he would establish is, using modern notation: If an event has happened m times and failed n times, the probability that its chance at a single trial lies between a and b is

$$\frac{\int_a^b x^m(1-x)^n\,dx}{\int_0^1 x^m(1-x)^n\,dx}$$

The problem is stated with reference to the rolling of balls upon a billiard table. Instead of integrals he uses areas of curves. It is assumed that before the event all probabilities are equally likely. Consider a simpler problem in which the same principle is involved.

An urn contains five balls, an unknown number of which are white, the rest black. Six times in succession a ball is drawn at random from the urn and replaced. If a white ball is drawn each time, what is the probability that all the balls in the urn are white?

Plainly such a set of drawings may be made from urns containing one, two, three, four, or five white balls, the probabilities of the observed event in these cases respectively being

$$\left(\tfrac{1}{5}\right)^6, \left(\tfrac{2}{5}\right)^6, \left(\tfrac{3}{5}\right)^6, \left(\tfrac{4}{5}\right)^6.$$

If it now be *assumed* that urns of these five compositions are of equally frequent occurrence, then among 5^7 urns taken at random there would be 5^6 of each kind; and if six drawings were made from each urn, the number of times that the observed event (all six balls white) was to be expected would be

$$1,\ 2^6,\ 3^6,\ 4^6,\ 5^6,$$

in the case of the five compositions respectively.

Upon this assumption, then, the probability that the six drawings have been made from an urn all of whose balls are white is

$$\frac{5^6}{1+2^6+3^6+4^6+5^6} = 0{\cdot}76163.$$

Our hypothesis is, as near as may be with five balls, the same as Bayes' theory of all probabilities equally likely before the event.

But suppose the five balls were put into the urn by lot, that one had tossed a coin and each time that head showed had put a white ball into the urn; each time tail showed, a black one. The probabilities of the various compositions would be proportional to the numbers 5, 10, 10, 5, 1, and the probability that the six times repeated drawing of a white ball is due to the urn containing five white balls is now

$$\frac{5^6}{5+10\cdot 2^6+10\cdot 3^6+5\cdot 4^6+5^6} = 0{\cdot}35479.$$

It is difficult to see why the last assumption is not as reasonable as the other.

Nevertheless, the assumption of all probabilities equally likely *a priori* is that upon which the treatment of inverse probability, as started by Bayes and developed by Condorcet, Laplace, and Poisson, has been based. The assumption is critically discussed by Boole in his *Laws of Thought* (1853), and an adverse conclusion reached (cf. PROBABLE INFERENCE, 2). If we are given that an occasion A leads to an event B with probability p, that alone will not suffice to determine the probability that B, having happened, did happen on the occasion A. We need to know also both the antecedent probability of A and the probability of B in the absence of A. If these probabilities be denoted by a and c respectively, the sought inverse probability is $\frac{ap}{ap+(1-a)c}$. Thus, it is more than a quarter of a million to one that a hand of four cards, if honestly dealt, shall not be four aces; but this tells us absolutely nothing as to the probability that, when four aces have actually been dealt, this result has been due to dishonesty.

Lagrange (1736–1813) wrote several memoirs upon the application of the theory of probability to the adjustment of observations. Considerable use is made of finite difference equations. Under certain arbitrary restrictions he derives a curve of errors, that is, a curve whose ordinates shall be proportional to the probabilities of the errors represented by the corresponding abscissae.

The naturalist Buffon, in his *Supplément à l'Histoire naturelle*, wrote in defence of Daniel Bernoulli's theory of moral expectation. He has a child toss a coin 4040 times to test the Petersburg Paradox. The coin showed head 2048 times, a deviation of 28 from 2020. A deviation as large as this is to be expected

38 times out of a hundred. Poisson, applying with much labour the theory of inverse probability, attempted to determine whether the deviation 28 was due to the imperfection of the coin. He finds it 4 to 1 that the coin favours head. But applying the same reasoning to a coin that on the first toss shows head, it would follow that it was 3 to 1 that the coin favoured head, an absurd result. The error is due to the fundamental fallacy involved in the arbitrary assumption (tacit or express) of some scheme of antecedent probabilities for the various possible causes of an event.

Buffon enriched the theory by problems involving geometrical considerations such as would now come under *local probability*. The following is famous:

A large plane area is ruled with equidistant parallel straight lines. A thin rod is thrown down. What is the chance that it shall fall across a line? If r is the length of the rod and a the distance between the lines, the probability is $\frac{4r}{\pi a}$.

Condorcet wrote a work entitled *Essai sur l'application de l'analyse à la probabilité des décisions rendues à la pluralité des voix* (1785). He attempts to show that the mathematical measure of probability is an accurate measure of our degree of belief. Satisfying himself as to this, he likens the obtaining of a man's opinions to the drawing of white or black balls from an urn. It is the computer's fallacy, so trusting to the machinery of computation as to neglect attention to the character of his data. *If* men were independent in their judgments, *if* each were right $\frac{5}{6}$ the time, then it would follow that a $\frac{2}{3}$ vote of a legislature of 300 members would be wrong just as often as you could expect 200 or more aces in throwing 300 dice; less than once in a million million times.

On the hypothesis of equal *a priori* probabilities, noticed above, Condorcet proves that if an event has happened pn times and failed qn, its probability is $\frac{pn+1}{n+2}$. Thus, that the sun shall rise to-morrow is very certain. But suppose, as has M. Bertrand, that one goes beyond the Arctic circle. If that be dismissed as fanciful, consider Laplace's calculation that it was 999,308 to 1 that the then received value for the mass of Jupiter could not be in error by so much as $\frac{1}{100}$. The perturbations of Juno proved that it was $\frac{1}{50}$ in error.

It remained for Laplace (1747–1827) to gather together all that had been done and to develop the science nearly to its present state in his *Théorie analytique des Probabilités* (1812). Much of the matter had appeared in various memoirs of Laplace written twenty-five years and more before. The mathematics of the work is remarkable for its difficulty. Among the more important results is the putting of James Bernoulli's theorem into a single formula.

We have seen, under the statement of Stirling's theorem, that approximately

$$\binom{n}{pn} = \frac{1}{p^{pn}q^{qn}\sqrt{2\pi npq}}.$$

Now, the most probable result on n occasions for an event of probability p is that the event shall happen pn times and fail qn times. That it shall do so the probability is

$$\binom{n}{pn} p^{pn}q^{qn} = \frac{1}{\sqrt{2\pi npq}}.$$

That, instead of this, an event shall happen $pn+x$ times and fail $qn-x$, the probability is

$$\binom{n}{pn+x} p^{pn+x}q^{qn-x}.$$

Laplace shows that, if n is large and x is small compared to n, this is approximately

$$\frac{e^{-x^2/2npq}}{\sqrt{2\pi npq}} = \frac{e^{-x^2/2\sigma^2}}{\sigma\sqrt{2\pi}},$$

where σ is the standard deviation $\sqrt{npq}$ and e is the Napierian base 2·718 .... If x is large, the true probability and the approximate are each so small as to be negligible; and hence, though Laplace's formula then no longer stands in approximately the ratio unity to the true value, no practical harm is done by using the formula for the whole range of values of x, from $-\infty$ to $+\infty$.

By means of this formula we are enabled to compute the probability that, in a large number of trials, the deviation of the ratio of the number of occurrences to the number of trials from the ideal ratio (that which would be found in the long run) shall not exceed a given quantity. A general conclusion which is immediately inferrible from the formula is that *the deviation against which we are guaranteed with a given degree of probability is inversely as the square root of the number of trials.* Thus, if with n trials it is 1000 to 1 that the deviation does not exceed ·01, then with $4n$, $25n$, $100n$ trials it is 1000 to 1 that

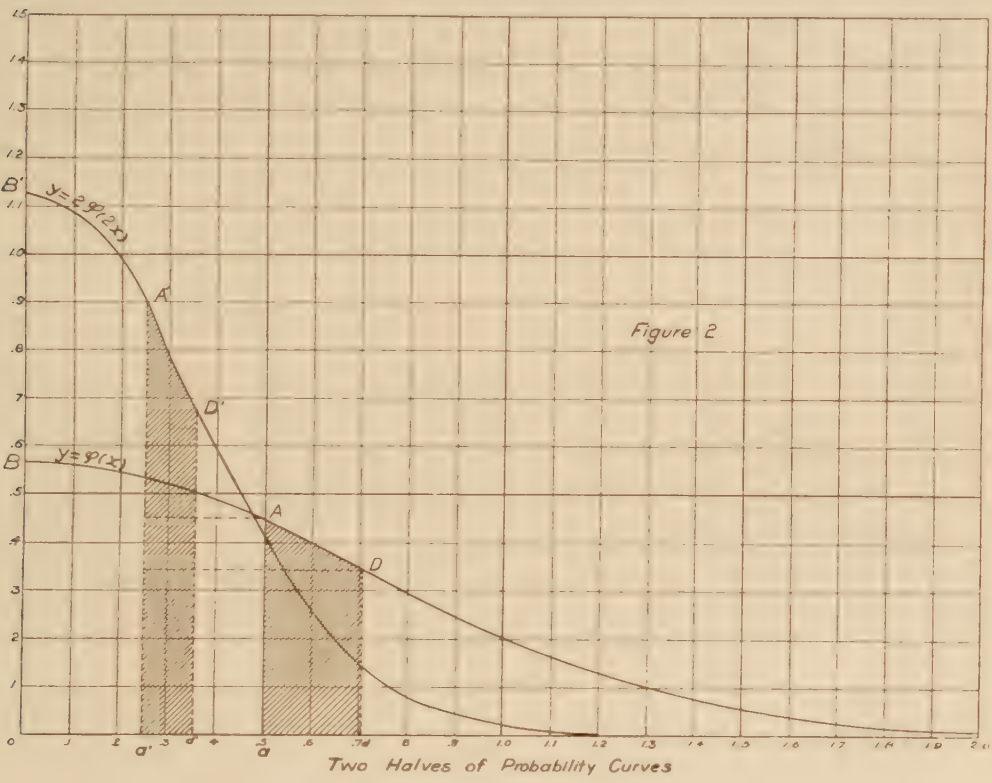
the deviation does not exceed ·005, ·002, ·001.

Equate Laplace's expression to y, and we have the equation of a curve, *the normal probability curve*, whose ordinates at integral distances from the origin are the probabilities of the various possibilities on n occasions. To each value of σ corresponds a distinct curve. In Fig. 2, $y = \phi(x)$ and $y = 2\phi(2x)$ are the halves of such curves, for $\sigma = \sqrt{\frac{1}{2}} = 0d$ and $\sigma = \frac{1}{2}\sqrt{\frac{1}{2}} = 0d'$ respectively. The area between the whole of either curve and the

The relation between the various curves is so simple that we need but one curve. Thus, if it be asked what is the probability of just 110 heads in 200 spins of a coin, we have $\sigma = 5\sqrt{2}$, $x = 10$. The probability is thus the ordinate for $x = 10$ in

$$y = \frac{e^{-x^2/100}}{10\sqrt{\pi}} = \frac{1}{10}\phi\left(\frac{x}{10}\right).$$

But this is one-tenth the ordinate for $x = 1$ in $y = \phi(x)$, or about 0·02.



Two Halves of Probability Curves

x-axis is unity. The shape of either curve is defined by saying that the rate per cent. of decrease in y as we depart from the y-axis is proportional to the absolute value of x, or the rate per cent. of decrease in probability as we depart from the most probable is proportional to the amount of departure. The curve $y = 2\phi(2x)$ is got from $y = \phi(x)$ by simply halving the x's and doubling the corresponding y's of every point upon the latter curve. Thus A and D become A' and D', while the shaded area $ADda$ becomes the area $A'D'd'a'$ without changing its value.

Note also that 0·02 is numerically the area between $y = \phi(x)$, the x-axis, and the ordinates at $x = 0{\cdot}95$ and 1·05, corresponding to the ordinates at $x = 9{\cdot}5$ and 10·5 to $y = \frac{1}{10}\phi\left(\frac{x}{10}\right)$. Similarly, the probability that the number of heads in 200 spins shall not differ by more than 10 from 100 is the area between the curve $y = \phi(x)$, the x-axis, and the ordinates at $x = \pm 1{\cdot}05$. This is twice the area between the curve, the axes, and the ordinate at $x = 1{\cdot}05$. Fig. 3 gives a curve $y = \Theta(x)$, whose ordinate for any x is numerically twice

the area between $y = \phi(x)$, the axes and the ordinate for the same x. The probability last mentioned is thus 0·88. The curve $y = \Theta(2x)$ bears the same relation to $y = 2\phi(2x)$ that $y = \Theta(x)$ does to $y = \phi(x)$. Tables of the values of Θ are given in most works on probability. Laplace was the first to suggest such tables.

To the standard deviation $\sigma = 5\sqrt{2}$ for $y = \frac{1}{10}\phi\left(\frac{x}{10}\right)$ corresponds the standard deviation $\sigma = \sqrt{\frac{1}{2}} = 0{\cdot}707$ for $y = \phi(x)$. Fig. 3 shows that the probability of this not being exceeded is $dD = 0{\cdot}68$.

The standard deviation is the square root of the mean squared deviation. Thus, if we had a great many sets of n spins each,

$$\sigma^2, = npq, = n \cdot \tfrac{1}{2} \cdot \tfrac{1}{2} = \tfrac{1}{4}n$$

would be the average of the squares of the deviations from $\frac{n}{2}$ heads in the sets. But our 200 spins can be regarded as 20 sets of 10 spins each. The deviations from 5 heads in the 20 sets are

$$-1, 1, 3, 2, -1, \quad 0, -2, 0, 1, -2,$$
$$0, 1, -1, -1, -1, \quad 0, -4, 1, 0, 1.$$

Their squares are

$$1, 1, 9, 4, 1, \quad 0, 4. 0, 1, 4,$$
$$0, 1, 1, 1, 1, \quad 0, 16, 1, 0, 1.$$

The average is

$\frac{47}{20} = 2{\cdot}35$, while $\sigma^2 = npq = 2{\cdot}5$.

The agreement would have been closer had we obtained the average by dividing by 19, one less than the number of sets.

Again, we may look upon the 20 sets as 20 observations to determine the probability of head. The value 0·485 of the probability got from the 200 spins is the same as the average of the values got from the 20 sets, i. e. from the 20 separate observations. The deviation from 5 of the number of heads in any set is replaced by the deviation from 0·485 of the corresponding probability. The sum of the squares of these divided by 19 will be the square of the standard deviation for a set. This comes out 0·0245 and $\sigma = 0{\cdot}157$. Finally, σ_0, the standard deviation for the mean of all the observations, is that for a single one divided by $\sqrt{20}$. This gives $\sigma_0 = 0{\cdot}035$, and is very closely $\frac{5\sqrt{2}}{200}$. The same method can be applied to other sorts of observations. Thus, the edge of a table is measured twenty times, giving results as follows:

Measurements, inches.	Deviations from Average.	Squares of Deviations.
27·86	−0·07	0·0049
·87	−·06	36
·90	−·03	9
·92	−·01	1
·87	−·06	36
·86	−·07	49
28·03	·10	100
·04	·11	121
27·92	−·01	1
·93	00	0
·97	·04	16
·96	·03	9
·93	00	0
·88	−·05	25
28·03	·10	100
27·98	·05	25
·85	−·08	64
·85	−·08	64
·92	−·01	1
·99	·06	0·0036
Aver. = 27·93	Sum of squares = 0·0742	

$$\sigma = \sqrt{\frac{0{\cdot}0742}{9}} = 0{\cdot}062$$

$$\sigma_0 = \frac{\sigma}{\sqrt{9}} = 0{\cdot}014.$$

If Bernoulli's theorem applies, 68 per cent. of the deviations should not exceed σ. There are 13 which do not.

The average of all the observations, 27·93, is that value of the measured quantity which makes the sum of the squares of the deviations a minimum and leads to the highest and narrowest probability curve. It was Legendre who, in 1805, suggested that the preferable value was the one which gives this minimum, and who used the name *method of least squares*. Adrain in 1808 deduced the probability curve from reasoning on the nature of errors of observation. Gauss did the same in 1809, and later gave still other deductions of the law of error. He it was who thoroughly developed the method, applying it not only to direct but to indirect and conditioned observations.

After all has been said, *the* proof of the validity of the method is that it works well in practice; works well if the observations are good, if the deviations are small. When this is not the case we try to get better observations.

As to the arithmetical mean, Ferrero has shown that the geometric mean, or any mean,

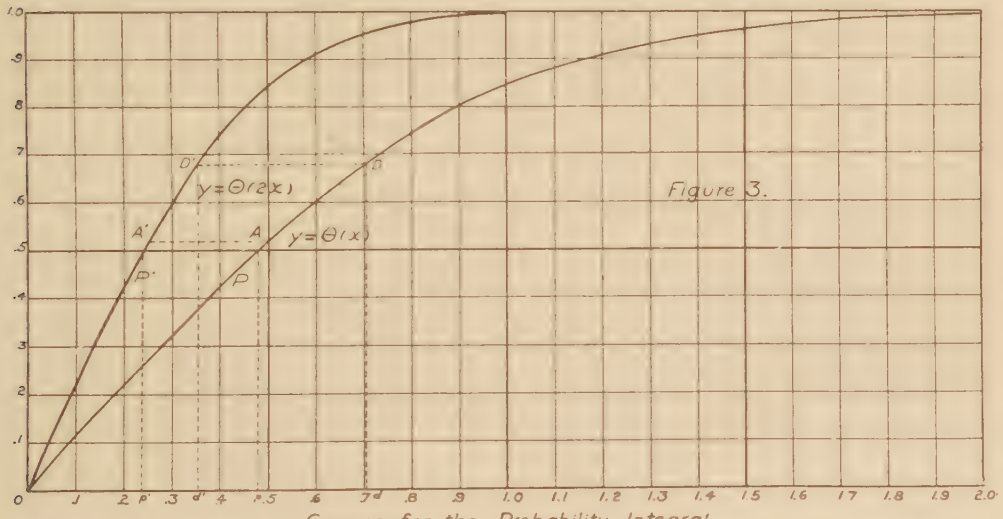
in fact, which treats all the observations on the same basis, leads to practically the same final results if the observations are good. If they are not, no mean can be relied upon. The arithmetical mean is the easiest to take.

There is no way of deciding beforehand whether the method will apply or not in cases in which the laws governing the production of the deviations or errors are unknown. There are classes of observations that follow laws of their own, and necessitate generalized probability curves and the superposition of curves. Their theory has recently been developed by Karl Pearson.

When deviation is normal, that is, when Bernoulli's theorem does apply, there may be two-way deviation, as in the firing of shots at a target. We then have a probability surface whose sections perpendicular to the plane of the two ways of deviation are probability curves, and whose sections parallel to that plane are ellipses. The theory was thoroughly worked out by Brevais both for this and three-way deviation in 1846. The constants in the equations involve not only the sums of the squares of the deviations, but also sums of the products, two and two, of the deviations one way by those in the other ways.

Pearson has extended the theory to *n*-way deviation.

Literature: Bernoulli, Ars Conjectandi (trans. by Haussner); De Moivre, The Doctrine of Chances; Laplace, Théorie analytique des Probabilités; De Morgan, art. Probability, in Encyc. Metropolitana; Gauss, Theoria Combinationis Observationum; Brevais, Analyse mathématique sur les Probabilités de Situation d'un Point; Boole, Laws of Thought; Todhunter, A Hist. of the Mathematical Theory of Probability; Venn, Logic of Chance; Czuber, Geometrische Wahrscheinlichkeiten u. Mittelwerte; and Beobachtungsfehler; Ferrero, Metodo dei Minimi Quadrati; Bertrand, Calcul des Probabilités; Poincaré, Calcul des Probabilités; Wright, Treatise on the Adjustment of Observations; Edgeworth, On Correlated Averages, Philos. Mag. (1892); Johnson, Theory of Errors; Pearson, Contributions to the Mathematical Theory of Evolution, Philos. Trans. Roy. Soc. (beginning 1894). (E.W.D.–F.F.)



Curves for the Probability Integral.

Probable Deduction: see Probable Inference (2).

Probable Error: see Errors of Observation.

Probable Inference: Ger. *Wahrscheinlichkeitsschluss*; Fr. *inférence probable*; Ital. *illazione probabile*. Any inference which does not regard its own conclusion as being necessarily true (though the facts be as the premises assert).

In such an inference the facts asserted in the premises are regarded as constituting a sign of the fact stated in the conclusion in one or other of three senses, as follows: i.e. that relation of the premised facts to the concluded fact which is regarded as making the former a sign of the latter (1) may be such as

could not exist until the conclusion was problematically recognized; this is inductive or experimental inference. Such a relation (2) may be altogether irrespective of whether the conclusion is recognized or not, yet such that it could not subsist if the concluded fact were not probable; this is probable deduction. Such a relation (3) may consist merely in the premised facts having some character which may agree with, or be in some other relation to, a character which the concluded fact would possess if it existed; this is presumptive inference.

(1) The first case is that in which we begin by asking how often certain described conditions will, in the long run of experience, be followed by a result of a predesignate description; then proceeding to note the results as events of that kind present themselves in experience; and finally, when a considerable number of instances have been collected, inferring that the general character of the whole endless succession of similar events in the course of experience will be approximately of the character observed. For that endless series must have some character; and it would be absurd to say that experience has a character which is never manifested. But there is no other way in which the character of that series can manifest itself than while the endless series is still incomplete. Therefore, if the character manifested by the series up to a certain point is not that character which the entire series possesses, still as the series goes on, it must eventually tend, however irregularly, towards becoming so; and all the rest of the reasoner's life will be a continuation of this inferential process. This inference does not depend upon any assumption that the series will be endless, or that the future will be like the past, or that nature is uniform, nor upon any material assumption whatever. Cf. INDUCTION, and UNIFORMITY OF NATURE.

Logic imposes upon us two rules in performing this inference. The first is this: so far as in us lies, the conditions of the experience should remain the same. For we are reasoning exclusively from *experience*, that is, from the cognitions which the history of our lives *forces* upon us. So far as our will is allowed to interfere, it is not experience; so we must take pains that we do not, in taking the instances from which we are to reason, restrict the conditions or relax them from those to which the question referred. The second prescription of logic is that the conclusion be confined strictly to the question. If the instances examined are found to be remarkable in any other respect than that for which they were selected, we can draw no inference of the present kind from that. It would be merely an infinitely weaker inference of the third kind (below). The present kind of inference derives its great force from the circumstance that the result is virtually predicted.

(2) The second kind of probable inference is, by the definition of it, necessary inference. But necessary inference may be applied to probability as its subject-matter; and it then becomes, under another aspect, probable inference. If of an endless series of possible experiences a definite proportion will present a certain character (which is the sort of fact called an objective probability), then it necessarily follows that, foreseen or not, approximately the same proportion of any finite portion of that series will present the same character, either as it is, or when it has been sufficiently extended. This is governed by precisely the same principle as the inductive inference, but applied in the reverse way. The same prescriptions of logic apply as before; but, owing to that being now inferred which was in the other case a premise, and conversely, it is not here true that the relation of the facts laid down in the premises to the fact stated in the conclusion, which makes the former significant of the latter, requires the recognition of the conclusion. This is probable deduction. It covers all the ordinary and legitimate applications of the mathematical doctrine of PROBABILITY (q. v.).

The legitimate results of the calculus of probability are of enormous importance, but others are unfortunately vitiated by confusing mere likelihood, or subjective probability, with the objective probability to which the theory ought to be restricted. An objective probability is the ratio in the long run of experience of the number of events which present the character of which the probability is predicated to the total number of events which fulfil certain conditions often not explicitly stated, which all the events considered fulfil. But the majority of mathematical treatises on probability follow Laplace in results to which a very unclear conception of probability led him. Laplace and other mathematicians, though they regard a probability as a ratio of two numbers, yet, instead of holding that it is the limiting ratio of occurrences of different kinds in the course of experience, hold that it is the ratio between numbers of 'cases,' or special

suppositions, whose 'possibilities' (a word not clearly distinguished, if at all, from 'probabilities') are equal in the sense that we are aware of no reason for inclining to one rather than to another. This is an error often appearing in the books under the head of 'inverse probabilities' (see that subject under PROBABILITY, where the view of Laplace is criticized).

(3) Probable inference of the third kind includes those cases in which the facts asserted in the premises do not compel the truth of the fact concluded, and where the significant observations have not been suggested by the consideration of what the consequences of the conclusion would be, but have either suggested the conclusion or have been remarked during a search in the facts for features agreeable or conflicting with the conclusion. The whole argument then reduces itself to this, that the observed facts show that the truth is *similar* to the fact asserted in the conclusion. This may, of course, be reinforced by arguments of some other kind; but we should begin by considering the case in which it stands alone. As an example to fix ideas, suppose that I am reading a long anonymous poem. As I proceed, I meet with trait after trait which seems as if the poem were written by a woman. In what way do the premises justify the acceptance of that conclusion, and in what sense? It does not necessarily, nor with any necessitated objective probability, follow from the premises; nor must the method eventually lead to the truth. The only possible justifications which it might have would be that the acceptance of the conclusion or of the method might necessarily conduce, in the long run, to such attainment of truth as might be possible by any means, or else to the attainment of some other purpose. All these alternatives ought to be carefully examined by the logician in order that he may be assured that no mode of probable inference has been overlooked.

It appears that there is a mode of inference in which the conclusion is accepted as having some chance of being true, and as being at any rate put in such a form as to suggest experimentation by which the degree of its truth can be ascertained. The only method by which it can be proved that a method, without necessarily leading to the truth, has some tolerable chance of doing so, is evidently the empirical, or inductive, method. Hence, as induction is proved to be valid by necessary deduction, so this presumptive inference must be proved valid by induction from experience.

The presumptive conclusion is accepted only problematically, that is to say, as meriting an inductive examination. The principal rule of presumption is that its conclusion should be such that definite consequences can be plentifully deduced from it of a kind which can be checked by observation. Among the wealth of methods to which this kind of inference (perhaps by virtue of its experiential origin) gives birth, the best deserving of mention is that which always prefers the hypothesis which suggests an experiment whose different possible results appear to be, as nearly as possible, equally likely.

Among probable inferences of mixed character, there are many forms of great importance. The most interesting, perhaps, is the argument from ANALOGY (q. v.), in which, from a few instances of objects agreeing in a few well-defined respects, inference is made that another object, known to agree with the others in all but one of those respects, agrees in that respect also. (C.S.P.)

Probation (in theology) [Lat. *probatio*, a test]: Ger. *Prüfung*; Fr. *épreuve*; Ital. *tempo di prova*. The state of moral trial in which the soul of man exists during the time that the offer of salvation is open to it.

The belief of the great majority of Christians is that probation ends with this life. The Catholic doctrine of purgatory is no exception, inasmuch as purgatory is conceived to be a place of purification, not of trial. The belief is entertained by many, however, that the period of trial does not end with death, but extends indefinitely into the future.

Literature: HODGE, Theology; DORNER, Christl. Glaubenslehre (1880); FARRAR, Eternal Hope; MARTINEAU, Christ. Dogmatics. (A.T.O.)

Problem [Gr. *πρόβλημα*, from *πρό* + *βάλλειν*, to cast]: Ger. *Problem*; Fr. *problème*; Ital. *problema*. (1) A question set forth for discussion with a view to a true and logically satisfactory answer; a 'dialectic theorem.' See Aristotle, *Topics*, I. xi. 101 b 1.

(2) A demonstrable practical proposition that something is possible. The solution usually consists in showing how it is possible and can be brought about. (C.S.P.)

Problematic [for deriv. see PROBLEM; the word was not in use in Gr. or Lat., though it may possibly occur]: Ger. *problematisch*; Fr. *problématique*; Ital. *problematico*. (1) The adjective imparting the lowest of the three grades of MODALITY (q. v.; see

also under POSSIBILITY) in the Kantian and derived systems of logic.

(2) In Greek it would mean pertaining to a problem; but the actual meaning, which is loose, is approximating to the import of an interrogation.

Sigwart and others maintain that problematic propositions are not propositions, because they are not assertory. If they are empty, their denials should be absurd, which does not seem to be the case. It is better to say that whatever presses as a question so much as to merit examination may properly be termed problematic. (C.S.P.)

Problematic Idealism: see SOLIPSISM.

Procedure (in law) [Lat. *procedere*, to proceed, through Fr.]: Ger. *Rechtsgang, Verfahren, Rechtsverhandlung*; Fr. *procédure*; Ital. *procedura*. The means provided by law for enforcing rights through the action of judicial or administrative tribunals. It includes all matters of process, pleading, practice, and evidence.

(2) The formal mode in which the functions of any branch of government are discharged.

Reformed procedure: an American system of simplified or 'Code' pleading, initiated in New York in 1848, and adopted in England by the Judicature Act of 1872.

In early societies rights often spring from forms. 'It would not be untrue to assert that in one stage of human affairs, rights and duties are rather the adjective of procedure than procedure a mere appendage to rights and duties' (Maine, *Early Hist. of Inst.*, lect. ix. 252. (S.E.B.)

Process [Lat. *procedere*, to proceed]: Ger. *Prozess*; Fr. *procès, processus*; Ital. *processo*. Continuous CHANGE (q.v.). (J.M.B.)

Process (mental): Ger. *psychischer Prozess*; Fr. *processus psychique* (or *mental*); Ital. *processo psichico* (or *mentale*). Continuous change in consciousness, or in mental disposition, or in both.

The continuity of mental process is of two kinds: temporal continuity and dispositional continuity, or continuity of interest. By temporal continuity is meant the fact that each state passes into that which succeeds it without a break in time. By continuity of interest is meant the fact that successive states of consciousness may be stages in the development of a single conative tendency. Continuity of interest may exist without continuity in time, and continuity in time may exist without continuity of interest. I can to-day resume a problem at the point where I left it yesterday. In spite of the interval of time, yesterday's train of thought and to-day's have continuity of interest. Again, while meditating on my problem my attention may be diverted by the arrival of a visitor. There is temporal continuity between my mental processes in attacking the problem and in entertaining my guest; but there is discontinuity of interest. Continuity of interest constitutes in part the bond between one individual consciousness and another, which makes possible which is called the 'collective' mind. I may work at my problem up to a certain point, and then communicate my method and results to another. He may continue the same train of thought, and in his turn communicate his results to me. In this way we may solve the problem in co-operation. Our minds act as if they were one mind, so far as concerns the attainment of the end which we both pursue. This kind of co-operation in thinking and willing constitutes the psychical organism of human society, and binds together the successive generations of mankind. The process, however, though divided among different minds, is individual, not social. Cf. SOCIAL ORGANIZATION, SOCIAL PROCESS, and TRADITION.

Other forms of distinguishable mental process, such as cognition and feeling, have continuity also, which can probably in all cases be reduced to temporal merely (as emotional change produced by external events), or to dispositional merely (as in the continuity of a disturbed cognitive process), or to these two existing together. The further question of the reduction of all phenomenal continuity in change to a principle itself not subject to change, as well as the attempt to consider mental process as an independent system of self-produced changes, leads into metaphysics. (G.F.S.–J.M.B.)

Process (social): see SOCIAL PROCESS.

Proclus. (412–85 A.D.) Educated at Xanthus in Lycia, at Alexandria, and at Athens. Became a celebrated teacher, and died at Athens. The last of the Neo-Platonists to exercise any considerable influence. Cf. NEO-PLATONISM, and ALEXANDRIAN SCHOOL.

Procreation: see REPRODUCTION (in biology).

Prodicus. Born on the island of Ceos in the 4th century B.C. He was a teacher of virtue or the art of living, a Sophist, and taught for money at Athens.

Prodigality of Nature. Darwin's expression (*Origin of Species*) for EXCESS or

Overproduction (q. v.) considered as a factor in the theory of evolution by Natural Selection (q. v.). See also Existence (struggle for). (J.M.B.)

Prodigy: see Monster, Sport (with 'freak'), and Miracle.

Prodromata [Gr. *πρόδρομος*, running before]: Ger. *Prodrome*; Fr. *prodromes*; Ital. *prodromi*. Premonitory symptoms; minor symptoms preceding the outbreak of a disease. See Premonition (2). (J.J.)

Produce [Lat. *pro* + *ducere*, to lead]. To be a Cause (q. v.). A vague general term. Cf. the topics following (with their foreign equivalents); also Invention. (J.M.B.)

Producer: see Production.

Production (and **Producer,** in aesthetics) [Lat. *productio*]: Ger. *Schöpfung, Produciren*; Fr. *production*; Ital. *produzione*. Used in reference to the point of view of the creation, as opposed to the appreciation or criticism, of a work of art; as in the phrases 'the producer's point of view,' the 'impulse of production,' &c. See Art and Art Theories, and Art Impulse.

The contrasted point of view often referred to as that of the 'spectator.' (J.M.B.)

Production (in economics): Ger. *Produktion*; Fr. *production*; Ital. *produzione*. The creation of utilities; especially of utilities fixed and embodied in material objects.

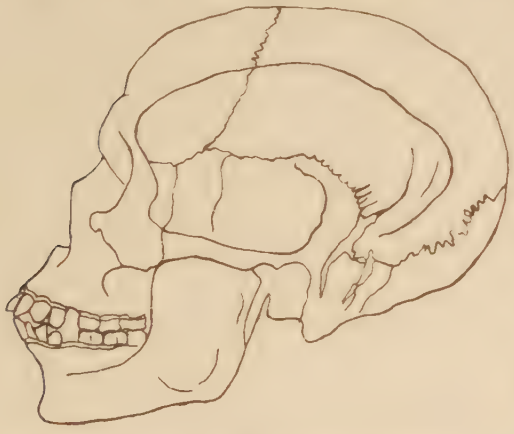
The earlier economists (e.g. Malthus) generally defined production as the creation of wealth. To meet the objection that man could create nothing, Mill answered that labour produced not objects, but utilities, and laid the foundation for the definition here given. Some writers prefer to make exchange value rather than utility the criterion of wealth production; thus Walker, 'the production of wealth means the creation of values.'

There has been some question whether the rendering of services should be counted as production of wealth. In the case of a service rendered, production and consumption are indistinguishable in time. If we are measuring wealth as a fund, a service rendered does not imply a production of any more of that fund; if we are measuring it as a flow of enjoyment, the service rendered is a part of that flow. (A.T.H.)

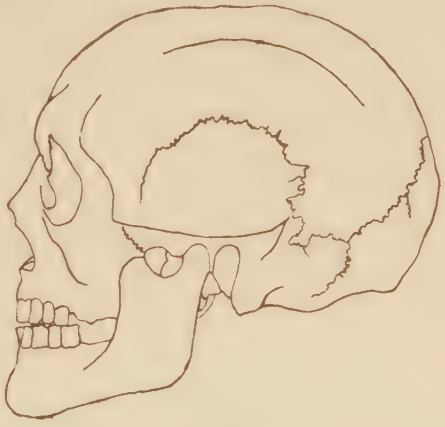
Profit [Lat. *profectus*, increase, advance]: Ger. *Unternehmergewinn*; Fr. *bénéfice*; Ital. *profitto*. (1) Excess of price above cost.

(2) Specifically that excess which is due to the management of capital.

Down to the time of Mangoldt it was customary to divide the price of products into rent for land, wages for labour, and profits for capital. Profits were further analysed into interest, insurance against risk, and wages of superintendence. Mangoldt, Walker, Marshall, and others showed that interest and insurance on capital were true elements of cost; that the real profit was what had been called wages of superintendence. They thus divided price into four parts instead of three: rent for land, wages for labour, interest for capital, and profit for business management. (A.T.H.)



Prognathous skull of negro (somewhat emphasized). (After Keane.)



Orthognathous skull of Kalmuck. (After von Bauer.)

Prognathism [Gr. *πρό*, forward, + *γνάθος*, jaw]: Ger. *Prognathie*; Fr. *prognathisme*; Ital. *prognatismo, prognatia*. The projection or protrusion of the jaw in advance of the forehead.

This characteristic is regarded as significant zoologically in the evolution of the higher animals, and ethnologically in the differentiation of races. It is measured either by the FACIAL ANGLE (q.v.), or by the subnasal facial, guathic, or alveolar index (Flower), which is the ratio of the length from the basion to the alveolar point, to the length from the basion to the subnasal point or nasion (lines BA and BN in the figure under CRANIOLOGY). When this index is below 98, the skull is orthognathous; when between 98 and 103, mesognathous; when above 103, prognathous. The figures illustrate the difference in appearance of prognathous and orthognathous skulls. (J.J.)

Prognosis and **Prognostication**: see PROPHECY, and MAGIC.

Progress [Lat. *progressus*, advance]: Ger. *Fortschritt*; Fr. *progrès*; Ital. *progresso*. Used loosely for any sort of continuous change towards a terminus, end, or ideal. It is opposed to regress, or change in a reverse direction (also loosely used). See the following topics. (J.M.B.)

Progress (economic). Increased command over the forces of nature for purposes of production, combined, as it generally is, with increased intelligence in utilizing the product for purposes of consumption.

Before the time of Malthus, increase in population would have been regarded as the clearest criterion of progress. After Malthus, population is relegated to the background as compared with production; for instance, in Mill's well-known treatment of the subject. The definition given is based on Bagehot's *Physics and Politics*.

The criterion accepted by most writers of the younger generation to determine whether an economic change did or did not represent progress, would be its effect on the survival of the community which adopted it, in the struggle for existence. (A.T.H.)

Progress (moral and social): see MORAL PROGRESS, and SOCIAL EVOLUTION AND PROGRESS.

Progressive: Ger. *progressiv, fortschreitend*; Fr. *progressif*; Ital. *progressivo*. (1) In medicine: progressive with regard to a disease indicates a gradual sequence of development, often with a predictable order of symptoms.

It serves, along with the words acute and chronic, to indicate types of onset and development of various diseases. Progressive paralysis (also termed general PARALYSIS, q.v., in the insane) is a well-recognized clinical form of insanity in which sequences of stages of increasing debility and dementia occur. Progressive muscular atrophy is a gradual wasting of muscular tissue, beginning in certain muscle groups and extending in a more or less definite order to others. (J.J.)

(2) In logic: proceeding through a linear series in the natural order. Opposed to regressive, or proceeding in a reverse order.

Progressive method: the method which proceeds from generals to particulars.

Progressive sorites: a SORITES (q.v.) in which the premises are so arranged as to proceed from what is regarded as whole to what is regarded as part. See Hamilton, *Lect. on Logic*, xix. (C.S.P.)

Project [Lat. *proiicere*, to throw forward]: Ger. *Projekt* (Sigwart); Fr. *projet*; Ital. *progetto*. (1) A possible course of action conceived simply, but not decided upon.

This follows the usage of Sigwart and Höfler (*Psychologie*, 518, 562), who make Projekt 'ein bloss vorgestelltes Willensziel.'

(2) That which is 'projected' in the second sense given under PROJECTION. (J.M.B.)

Projection: Ger. *Projektion*; Fr. *projection*; Ital. *projezione*. (1) The spatial objectivation of objects in sense perception. See LOCALIZATION (in space).

This usage is vague and descriptive, varying from the mere recognition of a spatial datum to the hypothesis of the spatial projection of states at first purely 'inner' and unspatial. It is also complicated with the hypothesis (Leconte, for vision) that nervous PROJECTION (q.v.), to the periphery, sometimes extends out in lines at right angles to the sensitive surface.

(2) A stage in the genetic construction of objects antecedent to the conscious antithesis between subject and object. This meaning, suggested by Baldwin (*Ment. Devel. in the Child and the Race*, and *Social and Eth. Interpret.*), applies especially to the material of the consciousness of self. The project is considered in contrast with SUBJECT (q.v.) and EJECT (q.v.)—the latter terms designating later phases in the genetic process.

Literature to (1): JAMES, Princ. of Psychol., ii. 31 (with numerous references); many citations in EISLER, Wörterb. d. philos. Begriffe, sub verbo (where projection is made equivalent to spatial localization). (J.M.B.–G.F.S.)

Projection (nervous, or 'eccentric'). (1) The property of the nervous system whereby

stimulations are referred to the periphery of the body or to the end-organs. Cf. Localization.

There is considerable scepticism as to whether this is an original property of the nervous system. It is undoubtedly developed by experience, but may probably be considered as in some way having a rudiment in the nerve structure. (J.M.B.–G.F.S.)

(2) Projection system: see Radiation.

Prolepsis [Gr. *πρόληψις*, anticipation; Lat. *anticipatio*]. A term of the Stoic philosophy denoting a concept derived immediately from perception. It was variously interpreted by ancient and mediaeval writers. Cf. Eisler, *Wörterb. d. philos. Begriffe*, 'Prolepsis.' (J.M.B.)

Proliferation (neural) [Lat. *proles*, offspring, + *ferre*, to bear]: Ger. *Zellvermehrung, Proliferation*; Fr. *prolifération*; Ital. *proliferazione*. The multiplication of nerve-cells by division of the pre-existing cells.

In an early embryonic stage such multiplication is very rapid, and is accompanied by mitosis. In these stages it plays a very important part in the formation of the peripheral nerves and their ganglia. Cf. Concatenation and the works there cited. Migratory neuroblasts form proliferating centres in various regions cut off from the ventricular epithelium. Recent writers (Herrick, Turner, Ayers) claim to find centres of permanent proliferation in older stages. The process is then apparently amitotic.

Literature: C. L. Herrick, Notes on the Brain of the Alligator, J. Cincinnati Soc. Nat. Hist., xii (1890); Contributions to the Comparative Morphology of the Central Nervous System, J. of Compar. Neurol., i. (1891) 21; C. H. Turner, Morphology of the Avian Brain, J. of Compar. Neurol., i (1891); H. Ayers, The Origin and Growth of Brain-cells in the Adult Body, J. of Compar. Neurol., vi (1896); W. His, Die Neuroblasten, &c., Abhandl. d. math.-phys. Cl. d. k. sächs. Gesell. d. Wiss., Leipzig, xv. 313–72 (1889), and Verhandl. d. 10. int. med. Congr., Berlin, ii (1890); C. S. Minot, Human Embryol. (1892), and Merkel and Bonnet's Ergebnisse, vi (for 1896) (1897); S. Paton, in Contrib. to the Sci. of Med., dedicated to Wm. Henry Welch (1900); A. Schaper, Die frühesten Differenzirungsvorgänge im Centralnervensystem, Arch. f. Entwicklungsmech., v (1897). (H.H.)

Proof [Lat. *probare*, to prove, through Fr.; it translates Lat. *probatio*]: Ger. *Probe*; Fr. *preuve*; Ital. *prova*. An argument which suffices to remove all real doubt from a mind that apprehends it.

It is either mathematical demonstration; a probable deduction of so high probability that no real doubt remains; or an inductive, i.e. experimental, proof. No presumption can amount to proof. Upon the nature of proof see Lange, *Logische Studien*, who maintains that deductive proof must be mathematical; that is, must depend upon observation of diagrammatic images or schemata. Mathematical proof is probably accomplished by appeal to experiment upon images or other signs, just as inductive proof appeals to outward experiment. (C.S.P.)

The entire psychological machinery of Reasoning (q. v.) is the instrument of proof. The verb prove means to produce adequate proof, which may be either 'direct' or 'indirect,' according as the proof process consists or not of the direct application of a rule or statement to a particular case coming under it.

Literature: Lange, as cited; Venn, Empirical Logic; Jevons, Princ. of Sci.; systematic works on logic. See Bibliog. C, 1, *b*, and 2, *j*. (J.M.B.)

Propensity and **Propension** [Lat. *pro* + *pendere*, to hang]: Ger. *Neigung, Hang*; Fr. *propension*; Ital. *propensione*. A term used loosely for any sort of more permanent active Tendency (q. v.).

Martineau (*Types of Ethical Theory*, ii. chap. v) uses propensions to designate the 'primary springs of action,' i.e. 'organic appetites and animal spontaneity.' James discusses the 'religious propensities' in *Varieties of Religious Experience* (*Gifford Lectures*, 1901).

In view of the meanings given (q. v.) to Disposition, Predisposition, Tendency, Impulse, Appetite, this general usage seems best. (J.M.B., G.F.S.)

Proper (1) and (2) **Propriety** [Lat. *proprius*, one's own]: Ger. (1) *passend, anständig*, (2) *Angemessenheit, Anstand*; Fr. (1) *convenable*, (2) *convenances* (pl.); Ital. (1) *conveniente*, (2) *convenienza*. (1) Fit. See Fitness (various meanings).

(2) Ethical and social Fitness (q.v.); but especially restricted to the social, meaning strict conformity to social convention, custom, and expectation. (J.M.B.)

Property [Lat. *proprium*, one's own, belonging to; trans. of Gr. *ἕξις*, a technical term of the Stoics, also of Gr. *ἴδιον*]: Ger. *Eigenschaft*; Fr. *propriété*; Ital. *proprietà, qualità*. (1) One of the logical Predicables

(q. v.); that one of the five ways in which the predicate may be related to the subject (the others being genus, species, difference, and accident), which signifies that the predicate has inherent connection with the subject.

(2) Hence, in the ontological sense, any quality or attribute which flows necessarily from the nature of the thing possessing it —thus distinct from accident, which may or may not belong to a thing. Cf. SUBSTANCE. (J.D.)

Property (in economics): Ger. *Eigentum*; Fr. *propriété*; Ital. *proprietà*. (1) The right to call upon the organized force of society to prevent unauthorized persons from enjoying certain commodities. This right is called ownership.

(2) The specific rights or titles which are protected by the above sanction.

Theories of property may be grouped under four heads.

(*a*) The *jurists* have generally said that property is based upon *occupancy*: a bald statement of fact, which gives no reason why past occupancy should be made a bar to rights of present occupants.

(*b*) The moralists have generally said that property rights *ought* to be based upon *labour*. The *reductio ad absurdum* of this view is found in George's *Progress and Poverty*: 'Nature gives wealth to labour, and nothing but labour. She fills the sails of the pirate as well as of the merchantman or missionary bark. . . . The laws of nature are the decrees of the Creator.' In other words, it would appear that the pirate, in virtue of his hard labour, has as good a right to the proceeds of his toil as the merchant or missionary.

(*c*) This *Historical School* bases property right on the *constitution of society*. The exponents of this view say that property is not a thing by itself, but one institution among many. It exists because the law protects it, and would not exist under a different set of laws or social conditions.

(*d*) The *Sociologists*, while admitting the truth of the views of the historical school up to a certain point, insist that the law exists because it protects property; and that property right in its present shape is to be explained as a *necessary motive* in the struggle for existence between different communities. The law of property protects title by occupancy, because stability and permanence of tenure are essential conditions for good use of wealth; it attempts at the same time to give all possible advantages to the labourer in becoming an occupant of his product, because in this way only is the fullest stimulus given to productive labour. (A.T.H.)

Psychologically, the 'acquisition impulse' (or 'instinct'), as it is called, seems to be very deeply rooted and to require recognition. Its existence is a refutation of the view which makes property rights conventional or artificial. Even among animals we find the recognition of a 'meum and tuum' not only towards other individuals, as for the young of the family, but also towards things. The bird claims the nest and even the whole tree as his own, and the dog guards his kennel with his life. In certain cases also, as the squirrel's store of food, it extends to provision for future needs. Certain birds, as magpies, also appropriate and claim useless objects as their own. In children this impulse develops very early. It must be counted a native tendency, though no doubt it owes much of its strength, and also the direction its development takes, to social example and precept. Its utility, from the genetic point of view, is so great—extending into all the details of personal life from the earliest period—that its survival and evolution would seem to be simply a great sociological fact. (J.M.B.)

Literature: WAGNER, Volkswirthschaftslehre, i.; see ECONOMICS. (A.T.H.)

Property (in law): Ger. (1) *Eigentum*, (2) *Eigentumsrecht*; Fr. (1) *biens*, (2) *propriété*; Ital. (*diritto di*) *proprietà*. (1) Whatever is the subject of ownership.

(2) The right of ownership. Cf. the preceding topic.

The essence of this right 'lies not so much in the enjoyment of the thing, as in the legal power of excluding others from interfering with such enjoyment' (Holland, *Jurisprudence*, chap. xi. 161). Public property: that belonging to the state or its governmental agencies. Private property: that belonging to private persons. Real property: in English and American law, land, and all rights arising from and annexed to land, which endure at least as long as the owner lives. Personal property: all other property, including a lease of land for any term of years, however long, not measured by the length of a life. Several estates may be carved out of the same property and held by different owners, as by the loan or lease of a thing, a pledge, a grant for life, or a conditional sale.

The Roman law divided property into *res corporales* and *res incorporales*. The test was whether it could be touched (*Inst. of Just.*, ii. 2, *de rebus corporalibus*, &c.). Modern

civilians divide it into *movable* and *immovable*, the latter embracing land and its incidents. See French *Code Civil*, Liv. II. tit. 1.

The air and the high seas are not the subject of ownership, although an act obstructing the right of another to their common use may be an actionable wrong. (S.E.B.)

Prophecy (in theology) [Gr. *προφητεία*, the gift of interpreting the will of the gods]: Ger. *Prophezeiung*; Fr. *prophétie*; Ital. *profezia*. Literally, prediction of future events; but in a larger sense, the organ through which a progressive revelation of divine truth is effected by means of inspired human agents called prophets.

In this larger sense prophecy is the human complement of inspiration. Through inspiration the prophet is informed with his revelatory message. The prediction of future events may or may not be a feature of prophecy in the more fundamental sense. The term prognosis is sometimes used as in general equivalent to prophecy.

Literature: Kuenen, The Prophets and Prophecy in Israel (London, 1877); Edersheim, Prophecy and Hist. in relation to the Messiah (London, 1885); Witsius, De Prophetis et Prophetia, Miscellan. Sacer, tom. i; Tholuck, Die Propheten u. ihre Weissagungen (2nd ed., 1860); W. H. Green, Moses and the Prophets (N.Y., 1883); Briggs, Messianic Prophecy (N.Y. and Edinb., 1886). (A.T.O.)

Prophet: see Prophecy.

Propitiation [Lat. *propitiatio*, from *propitiare*, to appease]: Ger. *Versöhnung*; Fr. *propitiation*; Ital. *propiziazione*. The act of placating a divinity who is supposed to be in a state of displeasure with the one who performs the propitiatory action. In Christian theology, that aspect of the Atonement by virtue of which it appeases the judicial wrath of God against the sinner.

Propitiation is to be distinguished from expiation, which is the suffering through which the propitiation is effected. Propitiation has direct reference to the divine wrath through which it is appeased. Expiation is more directly related to guilt. By expiating the guilt of sin the divine wrath is propitiated.

Literature: see Atonement, Justification, and Imputation. (A.T.O.)

Proportion [Lat. *pro* + *portio*, a part, a share]: Ger. *Proportion*; Fr. *proportion*; Ital. *proporzione*. (1) The aesthetically agreeable or harmonious relation to the whole of the unequal parts of any object.

Distinguished in this regard from symmetry, which refers to the relation of like and equal parts, with emphasis primarily upon their relations to one another rather than upon their relation to the whole. Like symmetry, proportion is distinguished from harmony by reference to quantitative relations, whereas harmony refers rather to qualitative relations.

(2) Applied also to the relations of objects in their entirety to some norm, as illustrated by the expression 'well proportioned.'

The term proportion is applied, aside from objects of nature, most appropriately to sculpture, architecture, and painting as involving drawing; secondarily and more metaphorically to music, poetry, the drama, and the novel. It is sometimes used loosely and untechnically as implying mere adaptation, and occasionally even as synonymous with symmetry.

The history of proportion as an aesthetic category has been essentially identical with that of harmony and symmetry. Zeising and Köstlin afford illustrations of recent modes of analytical treatment of proportion. Cf. Harmony, Symmetry, Golden Section, and Balance.

Literature: Köstlin, Aesthetik (1869); Zeising, Aesthetische Forschungen (1855); Day, The Sci. of Aesthetics (1893). (J.R.A.)

Proposition [Lat. *propositum*, from *proponere*, to place before]: Ger. *Satz*; Fr. *proposition*; Ital. *proposizione*. A Judgment (q. v.) expressed in words.

The term judgment denotes an 'axiomatic concept' (Zindler, *Sitzber. Akad. Wiss. Wien*, 118, ix. 32) which it is difficult, if not impossible, to define; but for the purpose of logic a judgment may be said to be an association of experiences or elements of experiences which has been made an object of reflection by a conscious mind, and whose validity has been accepted by it. By an association is meant not merely a coexistence or a sequence, but an association of any complicated kind whatever, or any more or less explicit analysis of a mental whole into parts (cf. Judgment). Thus *A conquers B* means that *A* is associated with *B* in the relation of conqueror, or that *B* is apprehended as *B* as conquered by *A*. Further, by an experience is meant any object of consciousness whatever, or any association of objects of consciousness; by the validity of the connection is meant merely its reality, or its occurrence in whatever universe, real or fictional or imagined, happens to be the background of the subject under discussion. (C.L.F.–J.M.B.)

Cf. the view of proposition given under

SUBJECT (in logic, 2), which is in certain respects different from what follows.

(C.S.P.–J.M.B.)

I. *The Import of Propositions.* It follows from the definition of the proposition that it must consist of at least three different members, two terms (between which the relation is said to hold) and another word whose function is to express at once the nature of the connection between them and the asseveration of that connection. (This double force of the copula is adverted to by Bradley, *Princ. of Logic*, 22.) In *Armies conquer countries*, we may think of *armies* and *countries* as the objects of consciousness, and of *conquer* as specifying the nature of the relation and at the same time asserting that it holds. But such a proposition as *A conquers B* can, if there is any occasion for it, be broken up differently, viz. into *A is one-of-the-conquerors-of-B*. Whether *B* or one-of-the-conquerors-of-*B* be regarded as the second of the related objects of consciousness is merely a matter of convenience, and will be determined in any actual case by considering whether other propositions, which it is desired to combine with this as data towards conclusions, have *B* or one-of-the-conquerors-of-*B* among their terms. Or, again, we can always decide which is for the moment the way in which we are regarding the proposition by considering whether in its inverted form it is the statement *B is conquered by A* or *One of those who conquer B is A* which interests us. To discover the three elements involved in *A runs*, we have, again, simply to invert it, *One who runs is A*. And the fact that there is no proposition which cannot be expressed in an exactly equivalent inverted form proves that this analysis of the proposition into two terms and a copulative connecting link is justified.

But there is one particular relation that we have by far the most frequently to deal with in reasoning—the relation of *b* invariably following upon *a*, or of *a* as the sufficient antecedent of *b*. This relation is variously expressed in words—*a* is-followed-by-*b*, *a* implies *b*, *a* is-indicative-of *b*, *a* is-a-sufficient-condition-of *b*, If *a* then *b*, The objects *a* are-included-among the objects *b*, or All *a* is *b* (where *a* and *b* may themselves be propositions, instead of simple terms, without altering the essential character, for logic, of the relation). In order to hold this relation present in consciousness in its purely abstract form, freed from all those variations of language which, rich in meaning though they may be, are entirely inessential to the purposes of logic, it is absolutely necessary to represent it by some symbol. Formal logic, as ordinarily treated in the books, is only semi-formal. It has been agreed, since the time of the earliest writers upon the subject, to allow terms to enter into propositions shorn of the special implications which follow upon their different meanings, and to represent them by colourless letters of the alphabet; it is only carrying this admirable device for abstracting from the inessential a little further if we represent the simple copula of *All a is b* by some symbol. We shall make use of the form $\prec$, a modification of that suggested by Peirce, for this purpose, and we shall write $a \prec b$ for any one of the copulative relations which have just been variously put into words. De Morgan regards this relation as sufficiently characterized by the fact that it is transitive, but that is a statement that needs modification. We shall then have for the formal representation of *Not all a is b* (corresponding to the plan of indicating *what is not a* by $\bar{a}$), the same sign with a horizontal mark indicating negation over it, as $a \not\prec b$. It will also add greatly to facility of expression if we write ∞ and 0 for the SPECIAL TERMS (q. v.) of logic, *everything* and *nothing* (or what exists and what does not exist). Innovations are difficult to make, and there was long and strenuous opposition to the introduction of the special quantity 0 into arithmetic and algebra; but it seems that the time has come when these simple aids towards extracting the essential from the accidental in logic should be used. Cf. SYMBOLIC LOGIC, ad fin., and TERM (negative).

This view, that the import of the proposition is to affirm some sort of connection between two objects of consciousness, dates from Aristotle. A favourite view of recent years is to maintain that in the simple judgment, *A* is *B*, there is both an analysis and a synthesis—that *A as being B* is given first, as an integral element of consciousness, and that the work of forming the judgment consists in first separating the concepts and then reuniting them by means of the connecting copula (cf. JUDGMENT). This is doubtless a correct account of the manner of forming immediate judgments, but it is not correct as a description of propositions. The examples of the proposition which are usually studied by the logicians are so cut and dried that it is difficult to detect its real essence; it is necessary to consider it in the process of being

formed, to see what it is really like. The act of the mind in the presence of such a situation as occurs in the following incident may be taken as the typical instance of the judgment: 'A prelate said, "My first penitent was a murderer"; a distinguished nobleman entered the room at that moment, and, after greetings, remarked to the assembled company, "You may not know that I was His Eminence's first penitent."' In the presence of two premises like this, we do not first get the nobleman and the murderer fused together in a mental content and then separate them in order to reunite them; but the two premises being held before the mind as a mental whole (that is, it being recognized that they hold good at one and the same time and place), an instinctive excision of the common element takes place, and the hearer finds himself forced to accept the hitherto unsuspected relation 'This nobleman is, then, a murderer!' (that is, the nobleman and murderer are, in this instance, one and the same object). It is the two premises—and, after they have been in part restated in the conclusion, it is this proposition—which brings about for the mind of the reasoner the conviction that the two descriptions appertain to one and the same object; that is, there is produced in his mind the complex conception 'this nobleman as being a murderer.' Expressed logically, it is through the compelling force upon the human mind of the fundamental principle of the syllogism (Sigwart), or it is, in psychological terms, through the irresistible impulse of the mind for *putting this and that together* when a common element (in this case 'first penitent') leads to their inclusion in a larger whole, that this proposition comes into consciousness. It is only after the two premises and the conclusion which they involve have effected the junction, for the hearer, of nobleman and murderer that the 'immanence' for consciousness of the one in the other exists, in a way which may then be explicitly declared in words (proposition). (C.L.F.)

The difference of view on this subject is probably to be accounted for by the distinction between judgment and proposition, especially when that difference is accounted for genetically by the 'communicative' or 'declarative' function of language. The normal psychological process seems to be the formation of judgment by the acceptance of an enlarged (synthetic) whole of mental content, and then the rise of proposition, in words, by analysis and for communication; this in the mind of the *speaker*. But in the mind of the *hearer*, to whom the relation expressed in the proposition is new, this procedure is apparently reversed: two more or less familiar terms are given to him in language, joined in a certain relation; and he, by accepting this relation, forms a new judgment. The logician, if he restrict himself to the point of view of the hearer, should deal strictly with propositions and their communication from one mind to another, holding that they are always synthetic; the psychologist, approaching the proposition from the point of view of mental process and meaning, finds that the proposition is always the analytic issue of an earlier judgment. Even when the hearer *hears* the proposition '*a* is *b*,' it is not *his* proposition until he has gained the judgment *ab* and recognized the relation of the parts *a* and *b* to each other or to the whole. (J.M.B., C.L.F., G.F.S.)

The nature of the relation between terms which is expressed by the simple copula of *All a is b*, $a \ll b$, has been variously taken to be (1) the inclusion of the group of objects represented by *a* among the group of objects represented by *b*; (2) the implication of the sensations or ideas *b* by the sensations or ideas *a* (Mill); or (3) the attachment to the group of objects *a* of the qualities involved in the meaning of *b*. (The purpose of any given asseveration is either to make an addition to the groups of objects already known to have the quality *b*, or else to add to the qualities already known to be possessed by the objects *a*; we can indicate by the emphasis whether we mean, for instance, '*Man* also is a primate,' or 'Man is a *primate* also.' So Venn and Baldwin.)

The reason that so many different views on this matter are possible would seem to be very simple: every term is a double-edged machine—it effects the separating out of a certain group of objects, and it epitomizes a certain complex of marks. It follows that no one of the above accounts of the nature of the proposition is complete; any statement involves in full a fourfold implication. Whoever says, for instance, that 'All politicians are statesmen' must be prepared to maintain that the objects politicians are the same as some of the objects statesmen, and are in the possession of all of the qualities of statesmen; and also that the quality-complex politician entails the quality-complex statesman, and is indicative of the presence of some of the objects statesmen. It is open to the psychologist to show that in any given instance one

or the other of these several meanings is what the speaker has most prominently in his mind, and we are able to put the abstract copula of $a \lessdot b$ into such a form of words as shall accentuate now one and now another of them (as, The *a*'s *are included among* the *b*'s, Being *a entails* being *b*); but from any one all the others can immediately be inferred, and hence, for the logician, the full content of the proposition involves them all. In dealing with this subject, logicians have been in the habit (as Keynes remarks) of committing the fallacy of exclusiveness, that is, of denying that one side of the shield is silver, on the ground that one side of the shield is gold.

The same doctrine is applicable to the compound proposition. *If a is b, c is d*, means that the instances of *a* being *b are included among* the instances of *c* being *d*, and that the truth of *a* is *b entails* the truth of *c* is *d*. The two different meanings are severally made prominent in *Whenever a is b, c is d* and *If a is b, c is d*; the former is more apt to be of empirical origin and the latter to be derived from other propositions, but either follows from the other, and hence, for logic, each is equivalent to the other. Writers on symbolic logic sometimes (Schroeder, Venn) develop the subject in terms of class-inclusion only (McColl in terms of implication only), and seem to think that some necessary connection is herein involved. But in doing this they have alienated the logicians of the regular school, not unnaturally, and they have introduced perfectly needless restrictions; $ab \lessdot 0$ means not simply that the class *ab* does not exist, but also that *a*'s which are *b*, *b*'s which are *a*, and *things which are* both *a* and *b* are all non-existent. It is true that to use the *language* of one or the other of the several meanings of the proposition is almost unavoidable, but the class-meaning and the attribute-meaning carries each the other with it; they are, like the gold and the silver sides of the shield, inextricably welded together. Herein appears the great advantage to be gained by the free use of the generalized copula $a \lessdot b$, which is *defined* as indicating explicitly all four of the implications; there is no form of *words* which does not seem to commit us more or less to one or the other of them, to the exclusion of the rest.

The metaphysician is able to think away all reference to an objective world, and to regard his experiences as merely ordered sequences among the elements and combinations of elements of his own consciousness. But the hypothesis that there is an objective reality standing in a one-to-one correspondence to this play of elements of consciousness is deeply ingrained in the human mind, and it is inextricably involved in our forms of utterance. Every term used to mark out an element of consciousness and to aid in conveying an intelligible statement to the listener posits the application to certain portions of reality (even the subjective world of the utterer is part of the objective world of the receiver), as well as giving him marks by which to recognize them. This reference to reality is implicitly present in every proposition; in some propositions it is present explicitly. In *Everything is material, All is vanity, Whatever is, is right, Everything is toil and trouble, Alles ist Gefühl*, the subject of the proposition is the whole of the universe, whatever it may be which is the subject of discourse. But any proposition can be immediately thrown into the form in which this reality reference is explicit. *All a is b* is the same thing as *Everything is* $\bar{a}$ *or b*, or $(a \lessdot b) = (\infty \lessdot \bar{a} + b)$ (where the symbol $+$ is used for the word *or*). This fact has led some writers to define the proposition as a 'description of reality,' and to say that reality is the 'real subject' in every proposition. This leads us to the consideration of the distinction between subject and predicate (for in the equivalence just stated, *a*, which was subject, has become an element of the predicate). When, e. g., *A* and *B* are alike individuals, what is the difference between *A is B* and *B is A*? A proposition, in its living form, is something which is set up—proposed—by the utterer for the acceptance of the receiver; the former throws into his subject all that he knows the latter is already willing to grant him, and to this he adds in the predicate what constitutes the new information to be conveyed by the sentence. The difference becomes patent in such sentences as these: *The large round red-covered table at which he is writing is dusty; The large round dusty table at which he is writing is covered with red.* The utterer chooses the first of these sentences when he knows that the receiver has noticed all the other determinants of the table—that to tell him of them would be throwing time away—but that he has not yet noticed that the table is dusty. All the part of the sentence before the *is* is thrown in to enable the receiver to pick out with certainty the object which is referred to; what

comes after the *is* is the matter freshly added. In the second sentence it is the knowledge that the object marked out by all the words of the subject is covered with red which is about to be introduced into the receiver's mind. In *A is B* we say, 'I know that you know who *A* is, perhaps you don't also know that he is the same person as *B*.' Now, the sentence $\infty \prec \bar{a} + b$, *Everything is non-a or b*, is correctly called a description of reality; but in the form *Everything which is a is b*, that is (to put in explicitly the implicit reference to reality), $\infty\ a \prec b$, it is not ∞, or the actual, which is being described, but only a limited portion of it, namely, so much of it as is *a*. It is, therefore, not correct to say that the proposition is a description of reality; it is such only when it is in a certain form. A proposition is a 'description' of whatever may chance to be its subject. It would be just as correct, and no more so, to say that every universal proposition *is* an affirmation of non-existence, because it can be thrown into the form $a\,\bar{b} \prec 0$. It is that, but it is something more. Bosanquet says that the real subject of discourse in any proposition is 'outside' the proposition; it would be more correct to say that only part of that outside term is the subject, except after the proposition has been thrown explicitly into the form $\infty \prec \bar{a} + b$. There is no one form of a series of equivalent proposition which gives their 'real' meaning; their real meaning can only be got by considering all their forms. (See below, pp. 368–9.)

II. *Kinds of Propositions.* Propositions are divided as regards the source of their validity into (1) empirical, (2) immediate, (3) derived.

Empirical propositions are the results of valid inductions. Immediate propositions are of several different kinds: (*a*) axioms, (*b*) postulates, (*c*) definitions, (*d*) verbal propositions, (*e*) propositions of immediate perception. (*a*) Axiomatic propositions are probably also empirical in the last analysis, but they are the result of such early experience, and they have become so deeply embedded in all our knowledge, that they are practically indistinguishable from what they would be if they were innate. (*b*) Only general propositions are properly called axioms; particular propositions, affirming existence, are postulates, as—what Poincaré calls a fundamental postulate of mechanics—something is constant, or the fundamental postulate of logic, something exists, or the postulate of geometry, figures can be superimposed. (*c*) With definitions or definitive propositions belong also any general assumptions temporarily taken for granted within a given argument. (*d*) Verbal propositions merely set forth in the form of explicit copula and predicate what has been already taken for granted in the meaning of the subject. 'What is taken for granted' is, of course, a term relative to the intelligence and knowledge of the person addressed, but it must always include at least the indispensable signification of the subject, that is, so much as is involved in its definition. (These propositions are also called —by Kant—analytic, but a less dignified name is preferable for propositions whose nature it is to be trivial.) Both 'real' and 'verbal' statements are *non-formal*; that is, the distinction is one that cannot be made until it is known what *a* and *b* stand for in $a \prec b$. Besides these there is a different sort still, which is valid (or not), quite independently of the meaning of the terms, as *a is always a*; *That a is b is the same thing as that non-b is non-a*. (*e*) These are usually singular propositions, as 'I feel cold at this moment,' and are not of frequent use in arguments. The essential characteristic of a proposition (1) is that it can be proved, but only by induction, which is more or less uncertain, and liable to overthrow as knowledge advances; a proposition (3) can be derived deductively from (1) or (2) or both together, and its degree of validity depends upon that of its premises; a proposition (2) cannot be proved at all. The axioms are frequently regarded as being necessary; they are certainly essential to our continuing to think without being overcome by mental dizziness and nausea. Sigwart regards all derived propositions as necessary (*Logik*, 2nd ed., 210), but those derived purely or in part from empirical propositions are surely not so—nothing can have greater validity than its source.

Propositions are simple, complex, or compound. A simple proposition is one in which the grammatical subject and the grammatical predicate are regarded each as a single logical term. In a complex proposition the subject or predicate, or both, are broken up, in the course of the argument, into separate elements, as when 'The undevout astronomer is mad' is transformed into 'Any astronomer is either devout or mad.' A compound proposition is a statement in which one, at least, of the terms is itself a proposition: as, *Never do mortals sin that angels do not weep; That some a is b and not any a is b should both be*

true is impossible. The latter is a doubly compound proposition.

III. *The Existence of Terms.* Do universal propositions imply the existence of their subjects? From *All a is b*, are we safe in concluding that *a*'s exist? The answer to this question is that in the statements of real life there is no general rule. For the most part we should regard it as waste of time to speak much about things which do not exist, yet we can say *All disobedience is punished* without in the least asserting that disobedience ever occurs. But in formal logic, where terms have become *a* and *b* and we know nothing about the meanings of our concepts, it is necessary to adopt some fixed convention in this matter; if any implications of this sort are made by propositions in general, we must know exactly what they are and be able to state them explicitly. The convention which many logicians accept is this: *Some a is b*, since it affirms the existence of *a* which is *b*, must be taken as implying the separate existence of both *a* and *b*. But in the case of *No a is b*, there is no difficulty whatever in admitting that one way in which it may become a valid statement is by our knowing that *a* or *b* (one or the other) does not exist at all. Moreover, it is indispensable that we should have in logic propositions that are the exact denials of each other; and hence if *Some a is b* is taken as meaning *Some a is b, and a and b both exist*, we must mean, in full, by *No a is b* that *No a is b or else a or b is non-existent.* It follows that *No a is b* cannot be taken as asserting the existence of either *a* or *b*. It is, however, an error to say that it makes no implication of existence; if there is no *a* which is *b*, then everything must be either non-*a* or else non-*b* (unless we are taking account of that imaginary universe in which nothing exists), and hence certainly either non-*a* or else non-*b* must exist. So in the proposition *All that is non-a is b*, we do not assert the existence of non-*a*, it is true; but the proposition is exactly equivalent to *All but a is b*, and this certainly affirms that *a* or *b*, one or the other, exists. On the other hand, the immediate denial of this last, *Not all but a is b*, though a particular proposition, makes no affirmation in regard to the terms that explicitly enter it; but it is equivalent to *Some non-a is non-b*, and hence it does affirm, by a necessary implication, the existence of both non-*a* and non-*b*. Hence the rule that is sometimes stated—particular propositions imply the existence of their terms, universal propositions make no implication in regard to the existence of their terms—is not correct. If it is said, for instance, that all is vanity, things that are vanity are certainly affirmed to exist (if anything exists). If the rule is limited to subjects—i. e. that particulars imply, while universals do not imply, the existence of their subjects—then it is true except in the case of two of the particular propositions of the complete scheme, *Not all but a is b* and *Some besides a is b*; but it does not give us all the information in regard to existence that we have the right to demand of the logician. The complete rule is this: *Express every universal proposition in the equivalent form,* All but *x* is *y, and every particular proposition in the equivalent form,* Some *x* is *y*; *then the particular proposition affirms the existence of both x and y, and the universal proposition affirms the existence of either x or y.* With this convention it is to be noted that *Some a is b* does not follow from *All a is b*, except with the aid of the explicitly stated minor premise, *There is some a.* [In most cases, however, the existence is not 'asserted' explicitly, but rather taken for granted. It should be added, also, that on another view, there is absolutely no difference between universal and particular propositions in the matter of their reference to existence; and much may be said for such a view.—J.M.B.]

A large amount of bad reasoning has been expended upon the question of the existence of terms, mostly due, of course, to the non-comprehension of what those who uphold the above doctrine mean by existence. The word is unfortunately chosen, for it has unavoidable metaphysical and psychological implications which invite confusion; existence in the sense of being something that we are capable of thinking about must of course belong to every term that is an element of a comprehensible statement, but that is not the sort of existence that the logician has in mind. It would be better to substitute for it the word *occurrence*, meaning occurrence within that field of thought which the speaker is talking about (see UNIVERSE OF DISCOURSE); when we say *Nothing has happened*, we do not mean to assert that nothing has happened within the planet Mars, nor that nothing has happened among the microbes. The word occurrence has the additional reason for its use that nothing else is possible in speaking of compound propositions (to which the above

doctrine is wholly applicable). When we deny *If a is b, c is d*, we affirm the (actual or possible) occurrence of *a is b* in conjunction with *c is not d*, and hence, all the more, the (actual or possible) occurrence of each in itself; but when we affirm it, we do not affirm that *a is b* ever occurs, but only that what is sure to occur is the *alternation* of either *a is not b* or *c is d*. There is an admirable and exhaustive discussion of this topic in Keynes' *Formal Logic*, chap. vii, Part i, 3rd ed., which ought to render further misconception impossible.

The correct doctrine in regard to subjects of propositions, though often overlooked, is of early date. Petrus Hispanus says (see Prantl, *Gesch. d. Logik*, iii. 61) that *omnis* in the major premise of a syllogism does not imply the actual existence of the objects which it sums up. It should be added that when we know the meaning of our terms and the sources of our propositions, we often have more knowledge than this about existence; if the proposition is empirical, there is usually implication of existence, as All roads lead to Rome; if it is derived from the axioms and fundamental principles of any science or of real life, there is not, as Whatever gods there are, are just.

The psychologists (if not the logicians) are right in saying that in the predicate the reference to objectivity, though implied, is not explicitly in the mind of the speaker; but that is accounted for by the application of what is frequently referred to as the *principle of parsimony*. It is sufficient if a single term carries the objective reference for the whole sentence, and to repeat this reference explicitly in the predicate would be tautologous. It is not predicates only which are without it, but also all elements of the subject, except one; thus we cannot think of *ab*, in $ab \lessdot c$, *architect-bankers are clever*, except as architects who are bankers, or as bankers who are architects, or as *things which* are at once architects and bankers. In citizen-student and student-citizen, only one word is a noun and the other is practically an adjective. (Wundt writes them, to indicate this distinction, *cS* and *sC* respectively.) The predicate-word, then (just like the determinant-word), though fully capable of bearing the reference to reality, has it, in general, only in abeyance. In contraposition, where subject and predicate change places, the reality-reference remains in the subject, $\infty s \lessdot c$ becomes $\infty \bar{c} \lessdot \bar{s}$ (*Whatever is a student is a citizen* becomes *Whatever is a non-citizen is a non-student*). Adjectives arise, in general, as predicate-words, but they may at any moment become, by themselves, subject-words, by throwing in the proper special term to carry them, as *Things which* are blue are cold. An adjective and a noun each represents a mental experience of more or less complexity held for the moment to be integral; the source of their difference is to be found in the doctrine of 'natural kinds' (see Kind). All the subjects of x constitute the application of x, and all the predicates of x constitute the signification or the implication of x; now adjectives are, in general, words of wide application but of very little implication, but nouns, on the other hand, are the names of natural kinds of great depth. We can say, e. g., *Things which are white are the brightest things in the field of view, Things which are white do not fade, Things which are white are easily soiled, Things which are white are suggestive of purity*, and that is almost all. The word represents a term of extremely little depth; *being white* has almost no further implication. It is for this reason that in the constructing of language it has remained solely an adjective. It is not the case that a word is a predicate-word because it is an adjective; it is an adjective because it is (owing to its little depth) almost exclusively a predicate-word.

The attempt to introduce propositions with quantifical predicates into formal logic has been over and over again shown to be a mistaken one; such a proposition can always be expressed in terms of two propositions of the regular scheme.

IV. *The Scheme of Propositions.* The proposition in *is* will usually contain, besides its essential elements, two modifying words, one of quantity and one of quality, as

Some | *a* | is | not | *b*,

and will thus consist in all of five constituents of different sorts. *Some* and *all* are indicators of particular and universal quality respectively; *not* and *the absence of any word* are what stand respectively for negative and affirmative quality. These several indicators may be treated by the logician as separate proposition-elements (and usually are so treated), or their implications may all be thrown into the copula, and we shall have thus what may be called the *figured* copula, as *a is-wholly b, a is-not-wholly b*. In the compound proposition this is the regular mode of expression; we say *p is-indicative-of*

q, That a is b is-not-incompatible-with c being d. Different symbolic copulas (modifications of $\prec$) may be devised for all the different relations of this sort, and the transformation from one to another may be made by mechanical rules. How many of these essentially different relations are there? The ordinary logic recognizes only four, and of these one is to a certain extent recalcitrant to rule, for the reason that it is in fact a member of a different scheme. Instead of *Some a is-not b*, we ought to express this member of the group of four as *Not all a is b*. This is the form in which it appears in Aristotle, and it frequently retains this form in the works of the schoolmen, as appears in the fact that the symbolic letters which stand for the several propositions, *A, E, I, O*, are said to be (but upon perhaps insufficient authority) the characteristic vowels of *πᾶς*, *οὐδείς* (*οὐδέν*), *τίς*, *οὐ πᾶς* (Prantl, *Gesch. d. Logik*, xv. 277, and iv. 153–4). The propositions admitted into any scheme should be propositions which are the immediate denials one of another, as *Some a is b, Not any a is b*. Pairs of immediate denials are

(a) *All a is b*,
($\bar{a}$) *Not all a is b*,

and

($\bar{m}$) *Some a is-not b*,
($\bar{\bar{m}}$) *No a is-not b*.

Either (a) and ($\bar{a}$) should be regarded as the canonical forms, or else ($\bar{m}$) and ($\bar{\bar{m}}$); to mix them up, as is done, is a pity, for the rules for TRANSFORMATION (q.v., in logic) apply very differently to the incongruous pair (a) and ($\bar{m}$), and hence much confusion arises. The right pair to choose is, of course, (a) and ($\bar{a}$); *All that glitters is gold* is properly denied by *Not all that glitters is gold*.

The actual number of different statements that are possible in terms of x and y and their contradictory terms $\bar{x}$ and $\bar{y}$ (excluding double negatives) is eight. This is at once evident if we express everything that can be said in the form of propositions of existence and of non-existence; thus the combinations of a and b and their negatives are ab, $\bar{a}\bar{b}$, $a\bar{b}$, $\bar{a}b$, and since each one of these combinations can be said to exist (a particular proposition, *There is some a which is b*, or *Some a is b*) or to be non-existent (a universal proposition, *There is no a which is b*, or *No a is b*), it is evident that eight different statements of fact are possible. These, of course, remain different, no matter what the form in which they may be expressed. One reason why logic commonly recognizes only four out of this set of eight is that it has fought shy of negative terms, and especially of negative terms as subjects. This is strange, because Aristotle gives, in his most fundamental group of propositions (those in one term only), four with negative subjects, as *Not-a exists, Not-a exists not*, &c. It is, however, De Morgan to whom we owe not only the generalization of the copula (which, he says, he has 'made as abstract as the terms'), but also the full introduction into logic of negative terms as subjects as well as predicates, and the setting out of the eight propositions of a complete scheme. De Morgan did not, however, devise appropriate copulas for the several statements to be made; but one does not have to search far, in the language of real life, to find such, and when they are found, the eight things to be said can all be said by means of them, very simply, without the use of any negative terms whatever. The letters *A, E, I, O* being no longer adequate, we may take *i* and *o* and their negatives to stand for the symmetrical copulas—those in which subject and predicate are simply commutable—and the unsymmetrical letters, *a* and *u* (*u* is perhaps sufficiently unsymmetrical), to stand for those copulas with which subject and predicate cannot be interchanged without change of sign. We shall then have

(a) All x is y,	($\bar{a}$) Not all x is y,
($\bar{u}$) None but x is y,	(u) Something besides x is y,
($\bar{\imath}$) No x is y,	(i) Some x is y,
(o) All but x is y,	($\bar{o}$) Not all but x is y.

The first two copulas in each column are non-symmetrical: *None but x is y* can only be inverted into *None but non-y is non-x*, and *Not all x is y* only into *Not all non-y is non-x*; in the last four propositions all terms are simply commutable.

Language furnishes us with perfectly adequate forms of expression for these eight modes of connection in the compound proposition as well as in the simple proposition. Thus we have

(a) If it rains it pours,	($\bar{a}$) Though it rains it does not always pour,
($\bar{u}$) Not unless it rains does it pour,	(u) Besides when it rains it sometimes pours,
($\bar{\imath}$) Never when it rains does it pour,	(i) Sometimes when it rains it pours,
(o) Unless it rains it pours,	($\bar{o}$) Not always except when it rains does it pour.

With the aid of negative terms, and the special terms 'nothing' and 'everything,' any given statement can be made in four different ways with any one copula:

(a_1) All a is b, (a_3) Nothing is a and $\bar{b}$,
(a_2) All $\bar{b}$ is $\bar{a}$, (a_4) Everything is either $\bar{a}$ or b;

and similarly their denials, the particulars. Or, for the compound proposition,

(a_1) If a is b, c is d, (a_3) Never is a b, that c is not d,
(a_2) If c is not d, a is not b, (a_4) Always either a is not b or c is d.

Now logic should either examine *all* these forms of speech, which are perfectly easy and natural in real life, or it should require everything to be reduced to *one* model form of expression before consenting to study it. It is one of the most remarkable of the curiosities of science that, of the four possible modes of universal statement, a certain two,

(a) All a is b,
($\bar{\imath}$) No a is b,

should have been regarded as canonical in dealing with terms, but a different two,

(a_1) If a is b, c is d,
(a_4) Either a is b or c is d,

should alone have been considered to exist in dealing with propositions. Symmetry and harmony and beauty of treatment were attainable only by admitting the complete scheme of possible statements which language has made for us. To admit for the simple and the compound proposition incongruous pairs was strangely ill advised; in this matter unconscious language-construction has shown itself far more intelligent than conscious logic-making. There is no arguing in terms of the so-called hypotheticals, disjunctives, &c., that has not its exact parallel in arguing in simple propositions; and the compound proposition as an element of an argument would not have required any different treatment from that given to terms, had it not been for this forced disjunction between their admitted modes of expression. It is for this reason, among others—to show the parallelism between simple and compound propositions—that the consideration of the full scheme of propositions is essential. (It is proper to regard *if* as a copula, for the actual meaning of If a is b, c is d, is Given that a is b, *it will always follow* that c is d. By an ellipsis of language we are allowed to say all this with the one little word *if*; but logic deals with the real connections of terms and of propositions, and its first task is to abstract from accidents of language.)

Wundt has proposed a set of symbols to stand for certain of these relations; but the relations which he symbolizes are neither complete nor symmetrically chosen, and the symbols which he makes use of have no connection with each other, nor do they lend themselves to negation. A better set can be constructed by means of variations of the fundamental $\leqslant$, so devised as to exhibit plainly the different relations which the copulas bear to each other and to the propositions which they represent:

$a \leqslant b$ All a is b.	$a \overline{\leqslant} b$ None but a is b.
$a \overline{\leqslant} b$ Not all a is b.	$a < b$ Some besides a is b.
$a \overline{\vee} b$ No a is b.	$a \Vbar b$ All but a is b.
$a \vee b$ Some a is b.	$a \overline{\Vbar} b$ Not all but a is b.

The negation of any relation is indicated by a line drawn over the corresponding affirmative copula. (This line is then to be regarded as an integral part of the copula to which it is attached.) As thus constructed, these symbols have certain marked coincidences with the relations that they symbolize; they are to this extent of the nature of diagrams, and fitted to hold in mind in a simple form the things that are reasoned about. These coincidences are: (1) Commutative relations are represented by a symmetrical copula; non-commutative relations by a non-symmetrical copula. (2) A copula involving an odd number of lines (i. e. three) is universal; a copula involving an even number of lines (i. e. two or four) is particular. (3) There is a simple rule for the transformation from any one copula to another, which need not be stated here.

The names of these several signs of relation are for universals: the copula of sufficiency, the copula of indispensableness, the copula of incompatibility (or non-concurrence, or exclusion), the copula of exhaustion; and these, together with their negatives (which express particular connections), constitute an exact enumeration of all the simple logical relations in which any two concepts or any two events can stand to each other.

For logic considered as the art and science of drawing conclusions, and of testing the validity of purported conclusions drawn by others, there is no difference between the simple proposition 'Whatever is *a* is *b*' (1) and the compound proposition (i.e. the proposition about propositions) 'Whenever *a* is *b*, it-follows-that *c* is *d*,' or 'That *a* is *b* entails that *c* is *d*' (2). But for that ultimate analysis of the meaning of the proposition which properly comes within the domain of psychology or of epistemology, but which has usually been given over to the logician, there is a distinct difference between them. In the case of (1), the full import is that the universe is such that the assumed substratum for those affections of consciousness which we have summed up under *a* is coincident in time and space (that is, occupies the same point of space at the same instant of time) with the corresponding substratum of the sensation-congeries *b*. This is what is at the bottom of our affirmation that the objects *a* are identical with some of the objects *b*. But when we affirm in (2) identity of occurrence of *a is b* with some cases of occurrence of *c is d*, the mind makes (one knows not why) a *far less complete fusion* of *a is b* with *c is d* than it makes of *a* and *b* in *a is b*; thus *a is b* may be an occurrence in South Africa, and *c is d*, however invariably attendant upon it, may be an occurrence in China; all that is affirmed is sufficiency in the antecedence of the protasis for the occurrence of the apodosis. Thus in 'Whenever the bell rings, the curtain falls,' our whole system of interpretation of conscious experience imposes upon us a far closer fusion in the *bell* which *rings*, and in the *curtain* which *falls*, than in the compound event which is constituted by their conjoint occurrence. There is more frequently perhaps an interval of time permissible in the compound event than in the compound object, but that makes no difference in the distinction here insisted upon. There is a certain fixed, continuing substratum in the case of *a* which later comes to be *b*; and there fails to be any such bearer of the event *a is b*, which is followed by the event *c is d*. (C.L.F.)

The forms of words which embody existential judgments ('sea-serpents exist') and impersonal judgments ('it rains') have occasioned much discussion. The former is discussed under JUDGMENT, where the alternative theories are also stated. As to the impersonal, the view indicated under PREDICATION is very current and goes very well with the theory of the existential. It makes the subject of the impersonal the entire sphere of reality (cf. UNIVERSE OF DISCOURSE) within which the observed or indicated phenomena present themselves. Genetically (and linguistically), the impersonal is a very early form. The child says merely 'rain,' assuming the world of fact to which his and others' experience are common. Cf. INDEX (in exact logic).

Literature: see the authors cited; the literature under the topics referred to; the general treatises on LOGIC, and BIBLIOG. C, 1, *b*, and 2, *l*. (J.M.B., C.L.F.)

Prosody [Gr. *προσῳδία*, what accompanies the song]: Ger. *Prosodie*; Fr. *prosodie*; Ital. *prosodia*. The term prosody is used by the Greek grammarians in relation to all the marks, including accents, breathings, quantities, &c., which might be added to the letters in the writing of lines of verse. In modern use it applies solely to the recognition of rhythmical form in verse. This rhythm is dependent on the orderly recurrence of long syllables in quantitative verse, of stressed syllables in accentual verse. (B.I.W.)

Prospection (-ive) and **Prospective Reference**: see ORIGIN *versus* NATURE.

Prostration [Lat. *prostratio*, an overthrowing or subverting]: Ger. *Prostration, Erschöpfung* (exhaustion); Fr. *prostration*; Ital. *prostrazione*. A serious and often sudden loss of strength; likewise a great depression; e.g. the mental and physical prostration sequent to the loss of a friend, to the shock of an accident, &c. Cf. SHOCK.

The term 'nervous prostration' indicates the feebleness and depression characteristic of NEURASTHENIA (q.v.). (J.J.)

Prosyllogism [for deriv. see SYLLOGISM]: Ger. *Prosyllogismus, Vorschluss*; Fr. *prosyllogisme*; Ital. *prosillogismo*. A syllogism whose conclusion is a premise of another. See CHAIN SYLLOGISM, and EPISYLLOGISM. (C.S.P.)

Protagoras. (480 cir.–411 B.C.) Studied under Democritus. Lived and taught in Athens. He was the first who taught philosophy and rhetoric for money, and the first to call himself a Sophist.

Protanopia [Gr. *πρῶτος*, first, + *ἀν* + *ὄπτομαι*, fut. *ὄψομαι*, I see]: Ger. *Protanopie*; Fr. *protanopie* (suggested); Ital. *protanopia* (suggested). The name proposed by v. Kries for what was formerly called red-blindness.

It is now known (especially by means of the monocular cases) that partial COLOUR-BLINDNESS (q.v.) or dichromasy, with a few exceptional

instances, consists in blue-and-yellow vision, with total lack of both the sensations red and green. Nevertheless, this red-green blindness is of two wholly distinct types (which are such as to have given rise to the earlier belief that in one of these types red-vision only was lacking, and in the other green-vision only): in the first, the so-called red-blindness, the red end of the spectrum is shortened, and the maximum brightness is further towards the green (protanopia), and this is much the more common form of the two; in the second, the so-called green-blindness (deuteranopia), neither of these two characters holds. It is important to have names for these two types, the more so as it will aid in banishing the erroneous terms red-blindness and green-blindness. The defect of the mid periphery of the retina is deuteranopia.

Literature: v. KRIES, Ueber Farbensysteme, Zeitsch. f. Psychol., xiii (1897). (C.L.F.)

Protasis [Gr. *πρότασις*, stretching forward, what is put beforehand]: Ger. *Vordersatz*; Fr. *protase*; Ital. *protasi*. (1) This is not a term of logic, but in grammar it now means the conditional clause of a conditional sentence.

(2) The Greek word was used by Aristotle in the sense of a premise, especially the major premise, or more generally, for a proposition. The corresponding Latin word would be *praetensio*. (C.S.P.)

Protection (economic) [Lat. *pro* + *tegere*, to cover]: Ger. *Schutz*, *Schutzzoll*; Fr. *protectionnisme*; Ital. *protezione*, *protezionismo*. The restriction of free competition: e. g. protection to child labour. Specifically, a system whereby international competition is restricted by the imposition of a high tariff on the importation of commodities.

Protection as a system was advocated by the Mercantilists and opposed by the Physiocrats. In the early part of this century it was condemned by nearly all economists; but it was advocated again about 1840 by Carey.

Almost all nations impose taxes at the frontier as a means of raising revenue. Up to a certain point an increase in the tax rate means an increase in the receipts; but beyond this maximum, the fall in imports more than balances the increased tax or duty on each article imported. It will thus happen that if a certain revenue, less than the possible maximum, is required, there are *two* tax rates either of which will give it. The man who chooses the lower is a free-trader; the man who chooses the higher is a protectionist. (A.T.H.)

Protective (and **Aggressive**) **Resemblance**: Ger. *Schutz(färbung*, &c.); Fr. *ressemblance protectrice*; Ital. *rassomiglianza protettiva*. A resemblance to some part of the environment which is of no interest to an enemy, for the purpose of defence: hence also called 'procryptic.' Mutatis mutandis, *aggressive resemblance* is concealment from prey for the purpose of attack: hence 'anticryptic.' See MIMICRY, and RESEMBLANCE.

Concealment for attack or defence is exceedingly common in nature, and must have been observed by all naturalists in all times. Erasmus Darwin, in the *Zoonomia* (i. 509, 1794), says: 'The colours of many animals seem adapted to their purposes of concealing themselves, either to avoid danger or to spring on their prey.' During the last forty years the subject has been studied in much detail as a result of the stimulus provided by the theory of natural selection. The pioneer in this labour is A. R. Wallace, who used this subject as an illustration of the working of natural selection in his section of the joint Darwin-Wallace Essay read before the Linnean Society on July 1, 1858. He there suggests that among animals, and especially insects with varied appearances, those 'having colours best adapted to concealment . . . would inevitably survive the longest.' Since that time, in many other works, Wallace has developed the details of the subject, has abundantly illustrated it, and stimulated many other workers to add to our knowledge of it. We can distinguish between *general resemblance* (both protective and aggressive) and *special resemblance*. In the former an animal is invisible in its environment, like medusae in the sea, or desert forms on land, by a general colour harmony, the shape and form not contributing to the concealment. In the latter, the animal resembles some special part of its environment in shape as well as in colour. Familiar examples are yielded by the resemblance of numberless insects to leaves or twigs. In such cases the animal is not invisible, but is liable to be passed by as an object of no interest to its enemy or prey. Many animals are often concealed by resemblance to the same surroundings, and incidentally come to resemble each other. Such likenesses may be called *syncryptic*.

The cryptic colours of many animals are *di-*, *tri-*, or *polymorphic*, varying through different shades or combinations of green and brown, the two chief colours of the vegetable world,

which forms the commonest of all environments. Thus, when the different individuals of a species are in part green and in part brown, an enemy is compelled to search over a wider area and to occupy more time in obtaining food. In many animals the colours change appropriately according as the environment is changed in the course of a life-history. Thus many caterpillars are green upon the food-plant, but become brown at the end of larval life, when they descend to the earth. In other cases there are regular seasonal changes of colour following the seasonal changes of environment, such as the white winter covering of many birds and mammals.

Variable protective resemblance. In the highest and most elaborate form of cryptic resemblance the colours of an individual can at any time be rapidly modified into harmony with any one of the normal environments. This power is possessed by certain reptiles (such as the chameleon), fish, crustaceans, and cephalopods, and it is dependent upon the connection between the nervous system, on the one hand, with the eye, and on the other with the contractile pigmented cells by which the colour is caused. In many sedentary larvae and pupae of Lepidoptera the individuals possess the power of adjusting their colours to the environment once, or sometimes more often. This is probably accomplished by the action of light reflected from surrounding surfaces upon the terminations of the nerves in the skin, and not through the eyes. The central nervous system is probably involved in the adjustment.

Adventitious protective (and aggressive) resemblance: allocryptic resemblance. In these examples an animal is concealed by actually covering itself with some part of its environment. With certain crabs (e. g. *Stenorhynchus*) the covering of *Algae*, &c., is changed when the animal is removed to new surroundings, and it is probable that a similar change of clothing is effected in the natural condition. The coloured food in the alimentary canal of many animals produces a cryptic effect, seen through the transparent body-walls. In certain caterpillars the chlorophyll of the food-plant exists in a modified form (metachlorophyll) in the 'blood' (haemolymph) or 'hypodermic' (epidermic) cells.

This subject is frequently confused with biological MIMICRY (q.v.), in which one animal resembles another which is specially defended and unusually conspicuous.

Literature: generally the same as for MIMICRY (q. v., in biology). (E.B.P.)

Protestantism [Lat. *protestans*, from *protestari*, to bear witness]: Ger. *Protestantismus*; Fr. *protestantisme*; Ital. *protestantismo*. The distinctive principles of the Protestant branch of the Christian Church, embracing three fundamental doctrines: (1) the absolute authority of Scriptures as a rule of faith and practice; (2) justification by faith alone; (3) the universal priesthood of believers.

The name Protestant originated with the protest of a body of the Reformed Church against the action of the Diet of Spires, 1526. It soon became an appellation of the whole Reformed movement. In spite of differences of sect and creeds there is substantial agreement among Protestants upon the three distinctive doctrines.

Literature: GIESLER, Eccles. Hist., Lehrb. d. Kirchengeschichte, iii; GUERICKE, Handb. d. Kirchengeschichte (Leipzig, 1866), ii; DORNER, Hist. of Protestant Theol. (Eng. trans., 1871); SCHAFF, The Princ. of Protestantism (1845). (A.T.O.)

Protist [Gr. *πρῶτος*, first]: Ger. *Protist*; Fr. *protiste*; Ital. *protista*. An organism consisting only of protoplasm, without any nucleus.

The name was proposed by Haeckel, but the majority of organisms regarded by him as protista are now known to have a nucleus, and it is not certain that any true protista exist; but some authorities claim that they do. From the evolutionary standpoint their existence is probable. See E. Haeckel, *Gen. Morphol.* (1866), and *Hist. of Creation* (Eng. trans., 4th ed., 1892). (C.S.M.)

Proton: see RUDIMENT, and ANLAGE.

Protoplasm [Gr. *πρῶτος*, first, + *πλάσμα*, anything formed or moulded]: Ger. *Protoplasma*; Fr. *protoplasme*; Ital. *protoplasma*. The living substance of the cell, exclusive of the nucleus. See LIVING MATTER.

The term was introduced by v. Mohl, and rapidly gained currency. The conception was widely spread by Huxley's celebrated lecture, *The Physical Basis of Life*, which embodied the results of Max Schultze and Kühne. Protoplasm consists of two materials, probably both fluids—the reticulum, and the cell sap or hyaloplasma which fills the meshes of the reticulum. Two theories as to the actual structure are current: (1) according to Flemming, the reticulum consists of threads; (2) according to Bütschli, the reticulum corresponds to the partitions of a foam-like structure.

Literature: E. B. Wilson, The Cell (2nd ed.); O. Hertwig, Die Zelle; Henneguy, La Cellule; Delage, L'Hérédité. See also under Living Matter. (C.S.M.)

Prototype: see Type and Typology (in religious philosophy).

Protozoon [Gr. πρῶτος, first, + ζῷον, animal]: Ger. *Protozoon, einzelliges Tier*; Fr. *protozoaire*; Ital. *protozoo*. An animal constituted by a single cell, or a group of similar cells. The cells may be multinucleated, and the body of the cell may be very considerably differentiated. Cf. Amoeba, Agamogenesis, and Conjugation.

Literature: O. Bütschli, Protozoa, in Bronn's Thierreich (1880–2); E. R. Lankester, art. Protozoa, in Encyc. Brit. (9th ed.); A. Sedgwick, Textbook of Zool. (1898); Y. Delage and Hérouard, Zool. Concrète, i (1896); Calkins, The Protozoa (1901). (C.S.M.–E.S.G.)

Proudhon, Pierre Joseph. (1809–65.) Political writer and sociologist. Born and partly educated in a village near Besançon, he was forced, by lack of means, to become a type-setter. In 1837 he won admission to the Paris Academy, and the Academy of Besançon awarded him a three-year stipend of 1,500 francs annually. In 1849 he was committed to three years' imprisonment for attacking the president of the Republic. His literary activity continued unabated, and in 1858 he was again committed for three years. He escaped to Brussels, returning to Paris in 1860, after the general amnesty, where he died.

Prove: see Proof.

Providence [Lat. *providentia*, from *providere*, to foresee]: Ger. *Vorsehung*; Fr. *providence*; Ital. *provvidenza*. The preordaining and regulative agency of God in the world as distinguished from his creative and sustaining activities.

Providence is an essential feature of the notion of the divine government, and implies not only power, but conscious care and solicitude. It presupposes a divine plan and provision, and involves personal attributes in the deity. In Christian belief a distinction is recognized between God's general providence and the special providence which has regard to the 'fall of a sparrow.' The Stoics recognized providence in a general sense, but denied special providence, which seemed to them to conflict with universal causation. (A.T.O.)

Provisional [Lat. *pro* + *videre*, to see]: Ger. *vorläufig*; Fr. *provisoire*; Ital. *provvisionale*. Temporarily adopted: applied most appropriately to any ratio resulting from inductive inquiry; for the value obtained will presumably be increased or diminished on further investigation. (C.S.P.)

Proximate [Lat. past participle of *proximare*, to approach, but it is used to translate *proximus*, next. The word occurs in Glanvil's *Vanity of Dogmatizing*, but in no English treatise on logic before Watts]. In philosophy, synonymous with Immediate (q.v., also for foreign equivalents), though not so strong.

Proximate cause and effect: an obscure term, like most of the terms of Aristotelianism, which acquired some practical importance owing to the courts holding that a man was responsible for the proximate effects of his actions, not for their remote effects. This ought to determine what should be meant by *proximate cause and effect*; namely, that that which a man ought to have foreseen might result from his action is its *proximate effect*. The idea of making the payment of considerable damages dependent upon a term of Aristotelian logic or metaphysics is most shocking to any student of those subjects, and well illustrates the value of Pragmatism (q.v.). Burgersdicius, who is one of the clearest of the Aristotelians, says: '*Proximate cause* is taken in two senses, to wit, *in suo genere* and absolutely. An absolutely proximate cause is one which constitutes its effect, not merely immediately, but by its mere existence; so that, if it exists, its effect (*causatum*, for Burgersdicius is not limiting his remarks to efficient causes) necessarily exists. The proximate cause *in suo genere* is that which immediately constitutes its effect, that is to say, without the intervention of anything else of the same order concurring to produce the effect.' Interpreting this in the light of pragmatism, the man should be held responsible for what might naturally be expected, or feared, as the result of his action; but not for effects depending upon subsequent occurrences which he could not anticipate. Burgersdicius continues: 'One thing may have many causes, proximate *in suo genere*, but only one absolutely proximate. . . . So the proximate material cause of man is his body; the efficient, his father; the formal, his rational soul; the final, *bene esse*.'

Proximate knowledge is direct knowledge of a thing, not knowledge through something else. Better called *direct knowledge*.

Proximate matter is matter in a state in which it is prepared for the reception of a

form. The proximate matter of a syllogism consists in its propositions, as distinct from the remote matter, which consists in the terms.

Proximate object of a directive (as we now say, normative) science is a certain one of the objects of practice, as distinguished from the object of doctrine. In speculative sciences there is only one object, the object of doctrine. In practical sciences there is besides an object of practice, which is that upon which it is designed to produce an effect. In a normative science, such as logic, there are two objects of practice—*the proximate*, which is the operation or action which is regulated, such as reasoning, and the remote, which is that in which that action takes place, such as a mind or a science conducted by many minds.

Proximate witness, testimony. There is hardly any such thing in English law. It is the witness who testifies, not to his own experience, but to facts which he knows by the immediate testimony of others. (C.S.P.)

Proximate (or **Second**) **Cause:** see CREATION.

Prudence [Lat. *prudentia*]: Ger. *Klugheit*; Fr. *prudence*; Ital. *prudenza*. Foresight or prevision of the consequences of our actions, and the guidance of conduct by such foresight.

This was regarded by Socrates as the indispensable condition and the absolute guarantee of virtue: 'virtue is knowledge.' It was also emphasized by certain members of the Cyrenaic school, and by the Epicureans. Butler tended to co-ordinate prudence with virtue, making the former the sphere of SELF-LOVE (q. v.), the latter that of CONSCIENCE (q. v.). The earlier hedonists, like Paley and Bentham, affirmed the coincidence in the experience of the individual, either present or future, of prudence and virtue, of egoism and altruism. The evolutionists hold that a tendency towards such a coincidence is to be recognized (cf. Spencer, *Data of Ethics*, chap. xiv); Leslie Stephen, however, regards this effort as no less hopeless than the attempt to square the circle or to discover perpetual motion (*Sci. of Eth.*, chap. x. § 35).

Sidgwick regards prudence as an equally intuitive principle with benevolence and justice: 'I hold with Butler that "reasonable self-love and conscience are the two chief or superior principles in the nature of man," each of which we are under a "manifest obligation" to obey' (*Meth. of Eth.*, pref. to 2nd ed., cf. Bk. III. chap. xiii). (J.S.)

Pseud- or **Pseudo-** (in compounds) [Gr. ψεῦδος, a lie]: Ger. *pseudo-, falsch-*; Fr. *pseudo-*; Ital. *pseudo-, spurio.* False, spurious, feigned.

Examples are: PSEUDAESTHESIA (q. v.); pseudochromaesthesia, the imaginary perception of colours in connection with sounds (see SYNAESTHESIA); pseudamnesia, an illusion or mistake of memory in which a person seems to remember that which he never experienced; pseudopsia, false vision, hallucination; instances under MIMICRY (q. v., in biology). (J.J.)

Pseudaesthesia [Gr. ψευδής, false, + αἴσθησις, sensation]: Ger. *Pseudästhesie*; Fr. *pseudesthésie*; Ital. *pseudestesia.* Illusion of sensation.

Applied especially to the cases in which irritation of the nerve at the point of amputation of a limb (e. g. stump of the arm) produces the sensation normal to the end-organ of the limb which has been removed (e. g. felt as if in the hand). (J.M.B.)

Psyche [Gr. ψυχή, breath, life, soul, from ψύχειν, to blow]: Ger. *Psyche*; Fr. *psyché*; Ital. *psiche.* (1) The Greeks conceived man as having a 'double,' a second, shadowy counterpart or likeness of the bodily existence, the ψυχή. This was not contrasted with the body in the way in which the psychical is now contrasted with the corporeal. It was rather conceived as a 'breath,' a thinner more subtile body, which formed the animating principle in life, left the body at death through the mouth or through a wound, and after separation from the body had an existence too unsubstantial to be called life.

Such was the Homeric conception. A more definite existence and influence were implied in the cultus of the souls of the dead which was maintained by families; and the worship of the gods of the underworld, especially the cultus of Demeter in the Eleusinian mysteries, directed men's attention towards the 'other world.'

(2) In the worship of Dionysus, which was introduced from Thrace and subsequently modified by contact with Apollo-worship, the 'psyche' becomes the primary superior half of man's nature. Exiled from some previous dwelling-place into the body, its life in this bodily state is a penalty rather than a privilege. It escapes temporarily in ecstasy (ἔκστασις) or frenzy induced by the sacred music or by fasting, and at such times becomes united to the god and inspired (ἔνθεος) by him. The true home of the psyche is not in the lower world, but beyond the stars.

Neither in this phase nor in the preceding is the psyche distinctly mental or spiritual, but in this phase its value is greatly enhanced, and the dualistic separation of later philosophy is anticipated.

(3) In the early philosophy of the Milesians and Atomists attention was so occupied with the cosmos that the psyche was conceived almost entirely as of like substance or φύσις with the world at large. Its character as a moving, animating principle led to its identification with the moving principle or element of the cosmos when such an element was distinguished. So Anaximenes regarded the psyche as air, Heraclitus and Parmenides as fire, Leucippus as fiery mobile atoms, Diogenes as the warm air or exhalation from the blood, Anaxagoras as participating in the NOUS (q. v.).

(4) The Pythagoreans, on the other hand, centred attention much more upon the psyche, and shared the views named under (2) above. The world of the psyche was regarded as higher and purer than the world of the body. Philolaus further sought to affiliate the psychology to the cosmology by conceiving the psyche as a 'harmony' of the bodily element, but it is difficult to reconcile this with the great emphasis placed upon the transmigration, and consequently upon the persistence and permanence, of the psyche.

(5) It was Plato who gave full philosophical valuation and expression of the religious and ethical views of (2). The soul (psyche) is in his view self-moving, immortal, akin to the gods, and if not completely identical with the ideas or οὐσία which form the world of true being, as contrasted with this visible world of generation and corruption, it is yet participant in the idea of life. It has seen the world of absolute being, truth, beauty, and goodness, and under the stimulus of beautiful forms recalls the visions of its pre-existent state. Life in the body is in truth an inferior existence, and the philosopher longs to fly away.

The psyche is also given a semi-psychological analysis, with a controlling or directing and a motor element. This latter is subdivided on an ethical principle into an appetitive and a 'spirited' (θυμοειδές) part, corresponding to what we should call the bodily appetites on the one hand and the finer, nobler instincts on the other.

(6) Aristotle, in his treatise *Concerning the Psyche*, approaches the problem once more from the biological and metaphysical standpoints. The psyche is the organizing form or ENTELECHY (q. v.) which gives unity to the bodily elements. It is the active principle. Three grades of such organizing activity are distinguished as the vegetative, the animal, and the rational soul, and these are not separable from the body. In the rational soul one part, the active NOUS (q. v.), like the psyche of (2), (4), and (5), comes 'from without,' and outlasts the bodily existence; but the psyche is not immortal, and some later members of the school denied the separate existence of the nous.

(7) Interest in the Stoic school centred not in the psyche, but in the PNEUMA (q. v.). This served at first as a medium between soul and body, at once material and psychical. It thus enabled the Stoic to state the whole life in corporeal terms, and yet to provide for the animating and mental activities. This naturalistic tendency was also conspicuous in the physicians of the time, who related the psyche more closely to the bodily functions, and, as against the view of Aristotle and the Stoics, located the psyche within the brain, where, indeed, Plato had located the thinking function, while assigning the θυμός or nobler emotions to the heart, and the bodily appetites to the liver.

(8) In the Jewish-Alexandrine, Pauline, and Neo-Platonist psychology, the psyche is in general treated as the animating principle in close relation to the body, whereas the pneuma (as representing the divine breath breathed into man), the nous, and the LOGOS (q. v.) stand for higher entities. They are the more universal, the more divine, the ethically purer. By this more explicit separation of the intellectual and ethical activities from the physiological the conception of the mental or psychical (in the modern sense) was at length reached.

Literature: ROHDE, Psyche (2nd ed., 1897); SIEBECK, Gesch. d. Psychol. (1880–4); CHAIGNET, Hist. de la Psychol. chez les Grecs (1887 ff.); STEIN, Psychol. d. Stoa (1886–8); ZELLER, Hist. of Greek Philos.; WINDELBAND, Hist. Philos., §§ 6, 11, 13, 18, 19; BENDER, Mythol. u. Met., i (1899); E. WALLACE, Aristotle's Psychol. (1882); RODIER, Aristote, Traité de l'Âme (1900).

(J.H.T.)

Psychiatry [Gr. ψυχή, soul, + ἰατρεία, a healing]: Ger. *Psychiatrie*; Fr. *psychiatrie*; Ital. *psichiatria*. The study and treatment of mental diseases. Psychiatrist is a synonym of alienist, and means a specialist in mental

diseases. See ABNORMAL PSYCHOLOGY, PSYCHOPATHOLOGY, PSYCHOLOGICAL MEDICINE, and PSYCHOSIS. (J.J.)

Psychic or **Mental** (1) and (2) **Psychological:** Ger. (1) *psychisch und* (2) *psychologisch*; Fr. (1) *psychique ou mental, et* (2) *psychologique*; Ital. (1) *psichico e* (2) *psicologico*. It is recommended that these terms mark a distinction between conscious process as it is apprehended (1) by itself and (2) by another.

For instances of its application, see MEDIACY AND IMMEDIACY, and ANALYSIS (a case in which the distinction is already realized in the German terminology). (J.M.B., G.F.S.)

Psychic (or **Mental**) **Blindness, Deafness, Dumbness,** and **Paralysis:** see BLINDNESS (psychic), DEAFNESS (psychic), DUMBNESS (psychic), and PARALYSIS.

Psychic Effect of Drugs: Ger. *psychische Wirkungen der Arzneimittel*; Fr. *effets psychiques des poisons*; Ital. *azione dei medicamenti sulle facoltà mentali.*

The fact that mental processes may be affected by the action of drugs is a common possession of mankind in all stages of civilization. Among primitive peoples the preparation of drugs that produce some form of intoxication is a widespread practice, and often acquires a ceremonial significance. The Orient has contributed several forms of psychic poisons, and recent chemical and pharmaceutical research has added others. The use of such drugs by the physician is insignificant compared to the extent of their abuse for the purpose of obtaining some form of mental indulgence. Alcohol and opium are the most important of such substances. The profound alteration of physical and mental vigour produced by over-indulgence of these poisons has made the regulation of their use a serious problem of modern society, and has aroused the ardent interest of all who have a concern for the moral welfare of mankind.

Information in regard to the effect of drugs upon psychic functions is derived from casual observation, from the recorded experiences of physicians in administering them for specific ends, and from experiments designed to determine by the application of psychological tests the precise influence of specific doses of given drugs upon the sensory, motor, and intellectual groups of functions. The descriptions of altered mental conditions and of the subjective experiences of persons under the influence of mental poisons also forms an instructive source of information.

In the present imperfect knowledge of the physiological substrata of specific mental processes, it is impossible to classify the action of drugs according to their effects upon the chemical constituents and functional activities of the several nervous centres. The most extensive investigations consider the effect upon the senses, upon movements, upon the general acquisitional powers, upon memory and association, upon co-ordination of delicate actions, upon logical alertness, upon emotional tone, upon the play of the imagination, upon general intellectual status. But it is not possible to arrange the available material according to any strict classification; one must be content with general descriptions which illustrate or emphasize some limited groups of typical effects. An important difficulty inherent in the study of this topic is the great fluctuation of individual susceptibility to different toxic substances, the dependence of the effect upon the dose, upon the manner of assimilating it, upon climate, race, social condition, general bodily tone, state of the digestion, &c. The cause of individual susceptibility and immunity is here, as in other connections, an unsolved problem.

The list of substances which have a more or less distinctly recognized effect upon mental processes includes alcohol, opium, hashish, morphine, chloral, chloroform, ether, cocaine, mescal, kola, tea, coffee, tobacco, the various hypnotics such as sulphonal, paraldehyde, the bromides, nitrate of amyl, and many other less familiar drugs and preparations (maté, kawa, lecheguana, anamirte, guarana, betel, &c.). It will be profitable to confine attention to the better known of these, and to consider first the results of specific experiments on normal individuals.

Kraepelin, and others through his instigation, measured the times of reaction to simple stimuli, the time required for simple sensory distinctions, and for indicating such distinctions by appropriate movements, the accuracy of estimating brief intervals of time, the quickness and nature of associations, the speed and accuracy of adding, the power of committing to memory, the muscular energy as indicated by the dynamometer, &c.; first under normal conditions, and then at intervals under the influence of given doses of alcohol, ether, chloroform, tea, morphine, bromide, &c. Of their conclusions the following are capable of brief statement. Alcohol in small doses (15 grammes) at first (for about 45 minutes) quickens and then slackens motor processes,

and from the start retards sensory and intellectual powers; in larger doses the quickening period of motor processes is shortened, and the retardation of all processes is extended over a longer period, but is not greater in degree. The action of ether and chloroform is quite similar, and consists in an acute quickening of motor powers, and retardation of sensory and intellectual powers; in light doses both effects disappear after about fifteen minutes; in stronger doses they may last half an hour, and the motor acceleration diminishes or disappears. Nitrate of amyl presents similar results. Chloral (1 gramme) shows a gradually increasing retardation or blunting of all the mental processes tested, which reaches a maximum after an hour or so, and is still perceptible after two hours. Morphine (·01 gramme) presents a marked motor retardation, reaching a maximum in 1¼ hours, together with an equally marked quickening of sensory and intellectual processes, which reaches a maximum in three-quarters of an hour. Trional presents a retardation in such processes as adding and committing numbers to memory, lengthens the time of adaptive or choice reactions, increases errors and omissions in reading letters and words passing across the field of vision, and slackens the speed of writing, but has no effect upon the associative processes, or the rapidity of repeating a given series of words or numbers, or upon the ergographic efficiency; i. e. trional affects the powers of acquisition, disposes them to error, and impedes the execution of co-ordinated movements. Bromide of sodium does not influence the automatic associations involved in adding, nor the innervation and execution of movements, but increases the difficulty of learning series of numbers, while lessening that of learning nonsense syllables; if, however, the learning goes on under conditions of distraction, the action of bromide is to facilitate such acquisition, i.e. to lessen the effect of the distraction, thus agreeing with the clinical use of bromide to dissipate subjectively distressing feelings of anxiety. The psychic effect of tea depends upon the caffein which it contains, and this brings about an increase in muscular efficiency, traceable to its direct effect upon the muscular tissue (although in Kraepelin's earlier results a diminution of motor power appeared), and also a facilitation of familiar associative processes, i.e. a gradual and distinct sensory and intellectual stimulation. The effect of alcohol on the practical efficiency of compositors' daily work has also been strikingly demonstrated. Fragmentary as such conclusions may be, they serve to indicate the trend of current investigation.

Clinical observation contributes information regarding the mental effects of frequent and habitual indulgence in drugs and of overdoses. The profound alterations due to alcoholic excess are described under ALCOHOLISM (q. v.). Like alcohol, opium, morphine, and chloral develop a craving for the poison, and thus produce a habit and the symptoms of a chronic poisoning. These present a great variety of abnormal mental phenomena, which, as in alcohol or opium, constitute the characteristic intoxication. Certain drugs produce no true intoxication, but only special and localized symptoms, while still others induce a more or less profound sleep and insensibility. Thus curare and Calabar bean (*Physostigma venenosum*), the 'ordeal-bean' of West Africa, produce motor paralysis through their action upon the spinal cord or directly upon the muscles, but leave sensibility and mental action unaffected; quinine produces a singing in the ears, and santonine induces a yellowish tinge in the visual field; strychnine increases reflex excitability, bromides allay it; cocaine produces a local anaesthesia; chloroform, ether, nitrous oxide gas produce sleep and general anaesthesia, while many preparations such as sulphonal and trional are administered as hypnotics. Excessive doses of almost any of these substances are truly poisonous, and may lead to fatal results. Referring to the medical treatises for the specific action of the large list of toxic substances, attention may be directed to the more intellectual changes which certain of these drugs induce.

Dreams, or dream-like play of the imagination, delirium and raving, illusions and hallucinations, changes of the personality may be induced by opium, hashish, mescal, &c. De Quincy's account, with due allowance for its literary and personal flavour, illustrates the variety of intellectual changes which opium indulgence may bring on; the formulation of the imagination, the increased vividness of recollection, the undermining of will energy, the stimulation of associative processes, the exaggeration of space and time relations, and the like. In an account of the action of hashish (*Cannabis indica*), by Clarke, the experience of a student with his first dose of the drug is recorded; he was shortly affected with acute megalomania; his personal attractiveness, his physical powers, the magnificence

of his possessions and surroundings were greatly impressed upon him, and led to a forcible expression of his superiority to the rest of mankind. Upon this ensued a splitting of the personality, in which consciousness No. 1 was a notable physician who proceeded to carry out remedial measures upon the person of consciousness No. 2. After a sleep the normal condition was re-established, but a vivid recollection of the extravagances of the hashish vision remained. In general it is stated that the hashish visions are magnificent and commanding, and are thus opposed to those of alcohol, which are often minute and terrifying and turbulent. The intoxication of mescal has been described as 'chiefly a saturnalia of the specific senses, and, above all, an orgy of vision. It reveals an optical fairyland, where all the senses now and again join the play, but the mind itself remains a self-possessed spectator.' Dazzling visions of marvellous colour-effects streaming with indescribable brilliancy and play of colour from the most common objects are described, combined with no other disturbance than a sense of weakness and a difficulty in respiration. Depression and excitement, volubility and incoherency, wild gesticulation, reflective ecstasy, an exuberant sentimentality, a voluptuous euphonia, an exaggerated sense of self-satisfaction and ambition, a distortion of orientation both literal and intellectual, and indeed almost any of the insane disturbances of psychic states and of emotional fluctuation may appear as the result of drug stimulation. The nature of such effects cannot be explained nor anticipated, owing largely to the important individual reaction to toxic stimulation and to the inevitably imperfect correlation of mental symptoms with physiological substrata in individual cases.

The study of the psychic effect of drugs yields one of the most significant forms of evidence of the interrelation between mental and bodily conditions; it contributes equally to the conception of abnormal mental activities; it offers a means of psychological analysis by varying certain factors of a psychological complex, and leaving the others unaffected. When the specific action of drugs on nervous elements shall have been ascertained, it promises to enrich the working conception of brain functions, while from a practical point of view it offers the physician the means of altering the mental condition and of allaying pain, but at the same time presents the problem of dealing with the drug habits so readily established in susceptible individuals.

Literature: KRAEPELIN, Beeinflussung einfacher psychischer Vorgänge durch einige Arzneimittel (1892); various arts. in Psychologische Arbeiten, i. (1896) 378–489, 500–68, 608–27; ii. (1899) 326–99; LEGRAIN, art. Poisons of the Mind in Tuke's Dict. of Psychol. Med.; E. H. CLARKE, Visions (1878); NORMAN KERR, Alcoholism and Drug Habits, in Twentieth Cent. Pract. of Med., iii. 1–139; SMALL, Poisoning, ibid., 497–623; H. ELLIS, Mescal, Contemp. Rev., Jan., 1898; RINGER and SAINSBURY, art. Sedatives in Tuke's Dict. of Psychol. Med.; also the works given under DELIRIUM. The classical psychological description is in DE QUINCY, Confessions of an Opium Eater. (J.J.)

Psychical Research: used also in the other languages. As a technical expression, psychical research owes its origin to the foundation of the English 'Society for Psychical Research' in 1882. The object of the society was, and is, to make an organized and systematic attempt to investigate various sorts of debatable phenomena which are prima facie inexplicable on any generally recognized hypothesis, and which may be regarded as having some bearing on the question of the independent existence and activity of mind apart from body. (Hereafter in this article the society is called the 'S. P. R.')

Some of the principal departments of investigation undertaken by the society are:—

(1) An examination of the nature and extent of any influence which may be exerted by one mind upon another, otherwise than through the recognized sensory channels (TELEPATHY, q. v.).

(2) The study of HYPNOSIS (q. v.) and hypnotism; and an inquiry into the alleged phenomena of clairvoyance. Under this head we may include various forms of automatism, which have engaged the attention of the society, especially crystal vision, automatic writing, and the finding of water by the divining rod.

(3) A careful investigation of any reports, resting on testimony sufficiently strong and not too remote, of apparitions coinciding with some external event—as, for instance, a death—or giving information previously unknown to the percipient (veridical hallucinations), or being seen by two or more persons simultaneously (collective hallucinations), or at different times independently.

(4) An inquiry into various alleged phenomena apparently inexplicable by known laws

of nature, and commonly referred by spiritualists (cf. SPIRITISM) to the agency of extra-human intelligences.

(5) An inquiry into the evidence for premonitions and previsions, for which see *Proceedings S. P. R.*, v, xi.

The aim of the society is to approach these various problems without prejudice or prepossession of any kind, and in the same spirit of exact and unimpassioned inquiry which has enabled science to solve so many problems, once not less obscure nor less hotly debated. The founders of the society have always fully recognized the exceptional difficulties which surround this branch of research; but they nevertheless believe that by patient and systematic effort some results of permanent value may be attained. A similar society was founded in the United States of America in 1884, and incorporated in 1890 with the British society. Societies with somewhat similar aims have been established in Germany and elsewhere, and much assistance has been received from individual workers in various countries. Psychical research has taken an important place among questions discussed at International Psychological Congresses.

The different branches of inquiry described under the four heads above are not of course independent of one another; and, in particular, facts elicited by investigations under heads (2), (3), and (4) form an important part of the evidence bearing upon the subject dealt with under the first head—the influence of mind on mind otherwise than through the recognized sensory channels, or telepathy. But closely connected though many of the subjects considered are, they cover a very wide range of phenomena; and the effort to treat the evidence offered for them in a scientific manner has necessarily led to the adoption of very various methods in different cases.

(1) As regards the first head, the experimental method assumes the most important place; and in applying it, the important thing in the first instance was to establish the fact of telepathy. But the establishment of the fact, that is, the negation of the ordinary channels of communication between mind and mind, is clearly a matter of extreme difficulty, if not impossibility, in any one case—not only on account of the danger of unobserved sensory indications, but on account of the very imperfectly known limits of the human faculties acting through the ordinary channels. The difficulty is increased by the fact that no means have yet been discovered for producing the phenomena of telepathy at will. If, in addition, the honesty of all concerned cannot be assumed—and of course, strictly speaking, it never can be—the problem becomes still harder. As regards probity, indeed, the only course seems to be to encourage as many varied experiments by various persons as possible, so that the widespread attribution of intentional deception which would be necessary to explain them all may ultimately become absurd.

The necessity of guarding against unconscious indications in experiments in thought transference or telepathy has led to a good deal of attention being paid to the possibilities of such means of communication as 'muscle reading' and unconscious whispering. Muscle reading, or the interpretation of slight movements and gestures, is the explanation of those public performances in so-called thought reading in which there is contact between the person 'willing' and the performer; and similar inteprertations, often doubtless unconscious, are the most probable explanation of the 'willing game' in private. The proved possibilities of muscle reading render worthless as evidence of telepathy almost all thought-transference experiments in which there is contact between the 'agent,' or person trying to transfer his thought, and the 'percipient,' or person trying to read it. Any whispering—even unconscious—by the agent of the idea to be transferred is more easily guarded against.

Notwithstanding the difficulties, a considerable mass of evidence for telepathy has been accumulated by different observers, and it is in this subject that the largest amount of important work has been done by the society. For a discussion of the evidence for telepathy and thought transference see TELEPATHY.

(2) Under the second head—hypnotism or mesmerism, &c.—interesting work was done by the late Edmund Gurney on certain psychological aspects of hypnotism, and particularly on the relation between more or less disconnected states of consciousness in the same individual (see *Proceedings S. P. R.*, ii, iii, iv, and v; see also the work of J. Milne Bramwell, published in *Proceedings S. P. R.*, xii). Much attention has, of course, been given of late years, in France and elsewhere, to the psychological aspect of hypnotism without reference to the problems of psychical research. The light thrown by hypnotism on the working of the mind is, however, of great importance in relation to psychical research, because of the opportunities hypnotism affords

for the experimental investigation of sensory hallucinations, automatic writing, and other forms of subconscious activities. The hypnotic state also seems favourable to the telepathic process, and some of the most successful experiments in telepathy have been conducted with hypnotized percipients.

Clairvoyance, which we have included under this head, is a term which has been used in several meanings. The two most important are: (1) the perception of things passing at a distance, and known to some living person, but not to any one in direct relation with the percipient; this may be regarded as a form of telepathy. (2) The perception of things unknown to any living person, e.g. a number taken at random from a bag and unseen by any one. For clairvoyance in this second sense there is not at present much evidence (see experiments by Richet, *Proceedings S. P. R.*, v, vi); nor have the S. P. R. obtained much experimental evidence for the first kind of clairvoyance (see, however, some experiments by A. Backman, ibid., vii). For a collection of spontaneous cases see papers by Mrs. H. Sidgwick, ibid.

Crystal gazing, which is a method of inducing visual hallucinations more or less at will—in most cases with but a slight disturbance, if any, of the normal consciousness—is a subject to which the S. P. R. has given a good deal of attention. Interesting observations and experiments on it will be found in the *Proceedings S. P. R.*, v, viii, and xii. Curious cases occur of the recrudescence through crystal visions of forgotten impressions, and it seems in some cases to be a way of bringing telepathically received impressions to the surface. Some persons who can see visions in crystals can similarly induce hallucination of voices by holding a shell to the ear.

The use of the divining rod for finding water is apparently an instance of automatic and unconscious muscular action resulting from an impression subconsciously received. Whence the impression comes, whether directly through the senses, or by subconscious inference, or by means of some unrecognized sense, is obscure. But there is strong evidence that underground water actually is found by 'dowsers,' where experts have failed to discover it by other means. The evidence has been exhaustively dealt with by W. F. Barrett in the *Proceedings S. P. R.*, xii and xv.

(3) Under the third head enumerated above, a large amount of investigation has been carried out by the S. P. R. into the subject of what are popularly called ghosts. Spontaneous visual and auditory hallucinations—the apparent seeing and hearing of things not forming part of the physical world—are not infrequently experienced by healthy persons; but in most cases there is, of course, no reason to attribute to these apparitions or voices any more importance than to the ordinary deliberately sought crystal visions. In a certain proportion of cases, however, the hallucination is 'veridical' or truth-telling. It coincides, that is, with some external event unknown to the percipient in a way that suggests a causal connection between the two. The most familiar instance is the apparition of a person at the time of his death at a distance. In such cases, after sufficiently establishing the fact of the coincidence, the question we have to ask is whether the coincidences occur more frequently than they would do by the operation of chance alone. The method of investigation becomes therefore statistical. A first attempt to deal with the evidence statistically was made by Gurney in *Phantasms of the Living*—a work in which the evidence up to that time collected for coincidental hallucinations was very fully treated—and for this purpose he made a considerable collection of apparitions coincidental and casual, in order to compare the two classes with each other. It was felt, however, even at the time, that a larger collection was required, and a committee, under the presidency of Henry Sidgwick, appointed at the Paris International Congress of Experimental Psychology in 1889, collected, with the help of friends, answers from 17,000 persons to the inquiry whether they had ever had a sensory hallucination. About 10 per cent. of these answered in the affirmative, and their experiences were carefully inquired into and analysed. The results (published in *Proceedings S. P. R.*, x, as the 'Report on the Census of Hallucinations'), besides bringing out much interesting matter of other kinds about the spontaneous hallucinations of healthy persons, showed among these 17,000 persons the alleged occurrence of 381 apparitions of persons believed by the percipients at the time to be alive, of which 80 were reported to have occurred within 12 hours of the death of the person seen. Even after making very large allowance for errors of various sorts, described fully in the report, the proportion is far beyond the 1 in 19,000 which, as shown in the report, could be accounted for as due to chance.

Apparitions coinciding with a death lend themselves especially to statistical methods of investigation, because the probability of their occurrence by chance can be exactly calculated. It will be observed, however, that statistical considerations play a large part in most departments of psychical research, even where the investigation is experimental. In experiments in thought transference, for instance, the results are as yet so little under control that the percipient as a rule has more often a wrong than a right impression of the idea the agent endeavours to transfer, so that our judgment as to the value of the results depends partly on an estimate of the number of successes that would probably be attained by chance.

Under the head of 'ghosts' the experimental method has been applied in two departments. First, a few persons have succeeded in telepathically causing a percipient at a distance to see an apparition of themselves or others. There is much need of further experiment of this very important kind. Particulars of some will be found in *Phantasms of the Living*, in *Apparitions and Thought Transference* by F. Podmore, and in the 'Report on the Census of Hallucinations' already referred to. But see also *Proceedings S. P. R.*, xiv. 114.

The experimental method has also been applied in the case of houses alleged to be haunted. It is obvious that apparitions seen in a house by one person, or even by different persons at different times, but presenting no marked characteristics unknown to the percipients, do not prima facie differ from ordinary subjective hallucinations. If, however, *B* saw in a house an apparition markedly resembling one seen by *A*, but of which *B* had not previously heard the particulars, there might be some ground for assuming a local cause for that apparition. Various attempts have been made under the auspices of the S.P.R. to discover similar apparitions seen independently in so-called haunted houses—the previous stories being kept secret from the would-be percipients—but so far these experiments have been almost without result.

Under head (4)—'spiritualistic phenomena'—widely differing phenomena are included. We have first the physical phenomena of spiritualistic séances—the alleged movement of objects and other mechanical effects, produced in the presence of certain persons called 'mediums' or 'sensitives,' without ordinary physical agency. The S.P.R. has published investigations, conducted before its own foundation by persons of repute, supporting the reality of such phenomena. It has also done useful work in exposing fraud and in demonstrating possibilities of mal-observation. A paper on this latter point by Hodgson and the late S. J. Davey (in *Proceedings S.P.R.*, iv) will be found interesting. But there has of late been little opportunity of investigating these phenomena, from a positive point of view, with 'sensitives' against whom there is no well-founded suspicion of fraud.

With these physical phenomena may be classed the alleged marvels which occurred in connection with Madame Blavatsky and the Theosophical Society, for although post-mortem agency was not claimed for them, they were largely similar in character to the phenomena of the séance room. They were carefully inquired into by the S.P.R., on whose behalf Hodgson visited India in 1884–5. His investigations, of which the report was published in *Proceedings S.P.R.*, iii, aided by the confession of some of Madame Blavatsky's accomplices, clearly showed that the marvels were due to trickery.

But what have proved the most fruitful subjects of investigation under this head are the communications received from 'sensitives' in the trance state, and usually claiming to come from deceased persons. Like automatic writing, such trance utterances, even when there is no conscious fraud connected with them, do not as a rule exhibit knowledge or intelligence beyond the sensitive's own. But there are exceptional cases in which the knowledge shown by a person speaking or writing in trance can hardly be supposed to have been acquired by normal means, and where we seem to require at least the hypothesis of telepathy, and sometimes telepathy between the sensitive and persons at a distance in no direct connection with him or her. Some of the communications are found by some writers difficult to explain without assuming post-mortem agency, and some investigators have convinced themselves of the reality of this. The most important publications by the S.P.R. of late years have been detailed accounts of prolonged investigations by Hodgson, W. James, Oliver Lodge, Newbold, Leaf, Myers, and others, with such a trance-speaking sensitive—a Mrs. Piper. Other inquiries, both with this lady and another, are in progress, and it is in this direction that most advance seems at present likely to be made in psychical research.

Literature: Proc. Soc. Psych. Res., i–xv (1882–1901; a 'General Index' of all the vols. is about to be published); Proc. Amer. Soc. Psych. Res., Pts. I–IV (1884–9); EDMUND GURNEY, FREDERIC W. H. MYERS, and FRANK PODMORE, Phantasms of the Living (1886); FRANK PODMORE, Apparitions and Thought Transference (1894), and Studies in Psych. Res. (1897); R. OSGOOD MASON, Telepathy and the Subliminal Self (1897); G. B. ERMACORA, La Telepatia (1898); ANDREW LANG, The Making of Religion (1898); TH. FLOURNOY, Des Indes à la planète Mars: Étude sur un cas de Somnambulisme avec Glossolalie (1900); Dr. A. LEHMANN, Aberglaube u. Zauberei (Ger. trans., 1898); F. W. H. MYERS, Human Personality and its Survival of Bodily Death (1902). See also under TELEPATHY. (E.M.S.)

Psycho- [Gr. ψυχή, the mind or soul]: Ger. *Psycho-*; Fr. *psycho-*; Ital. *psico-*. Used in combination to indicate what is in some degree psychic or mental. (J.J.)

Psychodynamics: theory of mental process considered as undergoing change and development.

Psychoneurosis: PSYCHOSIS (q. v.), with NEUROSIS (q. v.).

Psychoparesis: PARESIS (q. v.) having psychic cause or symptoms.

Psychophysiology: PHYSIOLOGICAL PSYCHOLOGY (q. v.), or PSYCHOPHYSICS (q. v.). A general and inexact term.

Psychostatics: theory of conscious states considered as elements or contents fit for composition or analysis.

See also the topics immediately following; and cf. PSYCHIC AND PSYCHOLOGICAL. (J.M.B.)

Psychodynamics: see PSYCHO-.

Psychogenesis [Gr. ψυχή, mind, + γένεσις, birth]: Ger. *Psychogenesis*; Fr. *psychogenèse*; Ital. *psicogenesi*. The origin and development of mind, and the science of it.

The term implies some form of development under natural laws, and so excludes the theories which deny this; as, for example, the 'special creation theory'—in so far as it denies real development or evolution — is not called psychogenetic. The problem of psychogenesis is twofold: (1) that of the beginnings and development of the individual mind; and (2) that of the beginnings and evolution of mind in the series of animal forms and in the history of man. See EVOLUTION, DEVELOPMENT, and (mental and social), with the literature cited there. (J.M.B.)

Psychogenic [Gr. ψυχή, soul, + γένος, birth]: Ger. *psychogenetisch*; Fr. *psychogénique*; Ital. *psicogenico*. Of mental origin; affected by mental influences. Cf. GENESIC.

The paralyses and anaesthesias of hysteria, the inhibitions and hyperaesthesias of hypnotic states, the pains and fears of neurasthenia, the ameliorations following appeals to faith or prayer are instances of psychogenic action. The terms subjective, imaginary, &c., are in one way or another inexact or misleading. Psychogenic is a technical term for the mental dependence proper to such symptoms. Psychogenic symptoms have in part an objective basis, but they are particularly amenable to mental influence. (J.J.)

Psychological Automatism: see AUTOMATISM (psychic).

Psychologism [Gr. ψυχή, soul, + λόγος, science]: Ger. *Psychologismus*; Fr. *psychologisme*; Ital. *psicologismo*. (1) The theory that 'the soul can think without any real object, or with an object furnished by itself . . . that man is both intelligent and intelligible in himself, suffices for his own intelligence, without any dependence on any objective reality' (Brownson, *Works*, ii. 482). Cf. ONTOLOGISM.

(2) The doctrine of Fries and Beneke (see the histories of Falckenberg and Windelband), which translates the critical examination of reason (of Kant) into terms of empirical psychology. (J.D.)

Psychologist's Fallacy: Ger. *Psychologenfehler*; Fr. *sophisme des psychologues*; Ital. *sofisma psicologico*. The fallacy, to which the psychologist is peculiarly liable, of reading into the mind he is examining what is true of his own; especially of reading into lower minds what is true of higher. 'The great snare of the psychologist is the confusion of his own standpoint with that of the mental fact about which he is making his report. I shall hereafter call this the "psychologist's fallacy" par excellence' (James, *Princ. of Psychol.*, i. 196; see also ii, Index, 'Fallacy'). (J.M.B.)

Psychology [Gr. ψυχή, the soul, + λόγος, discourse]: Ger. *Psychologie*; Fr. *psychologie*; Ital. *psicologia*. The science which treats of actual psychical processes, their objects as such, and the conditions of their occurrence.

This definition requires some explanation. In the first place, we have to ask: What is a psychical process?—and in the second: What are the conditions of its occurrence of which psychology must take account?

(1) A psychical process is a conscious

process; and an actual psychical process is a process as it takes place in the life-history of some individual consciousness at a particular time and in connection with some particular bodily organism. It is especially to be noted that psychology does not deal with abstractions as its distinctive subject-matter. Logic, when it treats of judgment, has in view only the abstract form of connection between subject and predicate, not the concrete process of judging as it takes place in an individual mind. But it is just this concrete process with which psychology is concerned.

Similarly, thought in the abstract, as the general relation between cognitive consciousness and what is cognized, does not belong to the distinctive subject-matter of psychology. What the psychologist is distinctively concerned with is the concrete operation of thinking.

Such terms as attending, questioning, doubting, hoping, fearing, desiring, being interested, &c., stand for psychical processes which involve the distinction and relation of subject and object. We cannot attend without attending to something, question without questioning something, hope without hoping something, &c. Now, the primary and distinctive interest of psychology is in the subjective side of this relation—in the process of attending, not in what is attended to, in the process of desiring, not in what is desired. The distinction between the subjective process and its object is in part of a formal nature, consisting of a difference in time-relation. The time-relations of the presented object itself are different from those of its appearance to consciousness. When we think of the future or past as such, our thinking is not future nor past, but present. When we observe a building, its parts and features are successively presented; but they are presented not as being successive, but as coexisting. When we attend to the order of presentation, we are attending to psychical process as such. When we are attending to the presented order, we are attending to the object—in this case to the building. But beside this formal difference of time-relations, the subjective process has also positive qualities of its own, which belong to nothing else. The questioning attitude, for instance, is no qualification of the object: it is a peculiar way in which we are conscious of the object. The object itself is thought of as determinate: it is only we who are undetermined in regard to it. Plainly, desiring, longing, and voluntary choice are subjective processes having their own positive nature as distinct from the nature of their object.

It has been said that the distinctive interest of psychology is in the subjective side of the subject-object relation. But this does not mean that the psychologist disregards the objective side. This is impossible. It is impossible to think of attention without reference to something attended to, or of a specific case of attention without reference to something specific which is attended to.

Apart from a certain reservation to be noticed later on, the essential point is that psychology only considers objects in their relation to subjective process. It is not concerned with their being and nature, so far as this being and nature is independent of their being actually cognized, attended to, willed, desired, &c., by an individual consciousness. The individual consciousness which knows, attends, wills, desires, &c., is directly interested in the independent being and nature of the objects themselves, and not in the fact that they are presented to it or in the features which belong to them only in virtue of their presentation; but it is just the fact of presentation and all that is connected with it which constitutes the special field of psychological inquiry. The object of cognition interests the psychologist only in so far as somebody cognizes it, or comes to cognize it, or attempts to cognize it, or forgets it, or remembers it, or fails to remember it, and so on. The object of volition interests the psychologist only in so far as somebody wills it, or comes to will it, or ceases to will it, &c. His interest in the object of cognition or will is inseparably connected with and conditioned by his interest in the processes of knowing and willing.

Thus he has no direct concern with the constitution and laws of the physical world. But it is his special business to exhibit the process through which such a world comes to be presented to the individual consciousness. He has no direct concern with spatial relations as the geometer has. But it is part of his task to show how the young child gradually becomes aware of such relations. He is not called upon to define the real distinction between right and wrong, or to determine the answer to any properly ethical question; but it belongs to his business as a psychologist to show how the individual comes to distinguish between what is morally right and what is morally wrong.

It must not be supposed that psychical process as such necessarily involves the dis-

tinction of subject and object. In principle it is possible to conceive a sentient being which should merely undergo changes of state without anything which could be called cognition. Such a being would have varied feelings without any distinction or recognition of their nature or of anything else. It would not be a conscious subject, but merely a feeling-thing. And even when the relation of subject and object exists, it does not follow that the whole content of the psychical life must enter into this relation. Part of it may have only such being as would belong to the feeling-states of the pre-subjective thing. It may well be that this mode of psychical existence belongs to the SUBCONSCIOUS (q. v.) as such.

This has an important bearing on the peculiar position of sensations in psychology. Sensations are both objects and psychical states. But they are not *subjective* states in the sense in which we are using the term subjective. Their psychical nature is such as might belong to them as states of a pre-subjective feeling-thing. In so far as they do enter into the subject-object relation, they fall to the side of the object rather than to that of the subject. But the fact that such objects are also psychical states in the sense explained invests them with a peculiar interest for the psychologist. He is not merely concerned with the process and conditions of their presentation as objects to a subject; he is also concerned with their own independent being and nature. Hence he carefully distinguishes their varieties, classifies them, investigates their qualitative affinities and relations, and inquires into the conditions of their production. If he investigated spatial relations in this way, he would cease to be a psychologist and become a geometrician. But all that can be known about sensations, it is the business of the psychologist to know. And the reason is that sensations, besides being objects, are also psychical, though not subjective, states.

(2) Psychology considers not only psychical processes, but also the conditions of their occurrence, which are only in part themselves psychical processes. Cf. CAUSE AND CONDITION. Thus it has to take account of the apparatus of sensation and movement. It is also compelled at every step to recognize the existence of mental dispositions inherited and acquired. Our actual conscious experience at any moment is determined by conditions which result from previous conscious experience. I recognize a man to-day because I met him yesterday, although I may not have thought of him in the interval. This can only be because my experience of yesterday has left behind an after-effect, which persists through the interval and determines my present consciousness. This is an acquired disposition. Again, what are called in ordinary language love and hatred are acquired dispositions of a complex character rather than actual psychical processes. Love involves such actual conscious states as being glad at a person's prosperity, grieved at his misfortune, rejoiced to meet him, sorry to part from him, and so on. But these conscious states are merely partial manifestations of the sentiment of love, varying according to the special occasion. The sentiment itself is the permanent condition of these varying phases of emotion. Similarly, the difference between the musical faculty of a Mozart and that of a man who can hardly learn to tell one note from another is a difference in inherited disposition. There are two ways in which dispositions may be regarded by the psychologist. He primarily knows them by their effects on conscious process. They are, from this point of view, merely 'permanent possibilities' of consciousness. But he also has another clue in the correlation of mental states and occurrences with nervous states and occurrences. Dispositions have their physiological concomitants in permanent modifications of nervous tissue. Whatever doubts may be thrown on the principle of psychophysical parallelism, so far as regards actual conscious process, they seem to have no practical force in the case of dispositions acquired or inherited.

Other definitions. Wundt's definition agrees with ours. According to him, psychology 'investigates the entire content of experience in its relation to the subject' (*Grundriss d. Psychol.*, 3). Similarly Külpe: 'Psychology is the science of the facts of experience in their dependency upon experiencing individuals.' But he immediately adds that the individual referred to is the corporeal individual. Now, it may or may not be true that psychology cannot make any real progress except in the way of connecting psychical processes with bodily processes as their determining condition. But this view is by no means so well ascertained or so universally admitted as to justify its inclusion in the definition of the science. Some writers, e.g. Th. Lipps and J. Ward, attempt to give a systematic account of the mental life without

reference to bodily processes at all. A similar objection applies to Avenarius' view: according to him the problem of psychology is 'to consider experiences from the point of view of their dependence on the individual.' But he identifies the individual with the neural arrangements and processes immediately correlated with the occurrence of 'experiences.' A mode of definition, once common, but now little used, is by reference to the peculiar way in which psychical processes are supposed to be known. Thus Beneke: 'The subject-matter of psychology is whatever we apprehend by inner perception and sensation.' This is open to the criticism that inner sensation is not an intelligible conception, and that inner perception can only be distinguished from outer by the nature of its objects—these being psychical states as such. A sense organ is as necessary a condition of the perception of hearing as of the perception of sound. (G.F.S.–J.M.B.)

Historical. Psychology as a systematic inquiry into psychical processes and their conditions may be said to have begun with Aristotle. His contribution to the subject is of real and abiding importance. In the first place, he is keenly aware of the intimate connection of body and mind. For him, conscious process is a phase of vital process. Soul (ψυχή) is simply the principle of life, including vegetative and spontaneous movement, as well as sensation, memory, conation, and conceptual thinking. It must not, however, be supposed that he regarded life as a mere function of matter in the modern sense. The living body and its life are mutually dependent, and therefore relatively independent. You cannot have life without a body which lives; but, on the other hand, you cannot have a living body without a vital principle, which is more than mere bodily process. The body and its life together constitute one individual substance which cannot exist without both of them. In the second place, we owe to Aristotle the systematic distinction of stages or levels of mental process, so ordered that each higher stage presupposes the existence of the lower, but not conversely. Thus spontaneous locomotion presupposes vegetative process. But vegetative process does not presuppose spontaneous locomotion, and can exist without it, as in plants. Retentiveness and reproduction presuppose sensation. But sensation can exist without being retained or reproduced. Conceptual thinking presupposes mental imagery (φαντασία), containing revivals of previous sensation. But mental imagery can exist without conceptual thinking. This point of view may be regarded as containing the first suggestion of the genetic method in psychology. For Aristotle holds that in the ascending scale of animal life lower stages actually exist before higher, being followed and supplemented by these in progressive order, until in the fully developed human being they all combine in systematic unity. Finally, we owe to the Greek thinker many important discussions of special psychological topics. Among these we may refer to his elaborate and penetrating account of sense-perception and of its physical and physiological conditions; his enumeration of the different principles of association—similarity, contiguity, and contrast—and his explanation of dreams. As compared with modern psychology, Aristotle's procedure exhibits the characteristic shortcomings of Greek science. Its main tendency is towards mere classification, and hence it stops short with certain general conceptions, such as those of sensation, retentiveness, imaging, reasoning, &c. There is no systematic effort to analyse these processes so as to exhibit the factors which are at work in them and the laws and forms of their interaction. Thus, though Aristotle clearly recognizes the principle of association, he makes no extended use of it as a general clue to the labyrinth of psychical life. It is due to this habit of dealing with large and more or less vague generalities that psychological questions rarely assume for Aristotle such a shape as obviously demands for their solution minute, varied, and systematic observation of particular facts, to say nothing of experiment.

Yet Aristotle certainly made an excellent start, and it is perhaps not going too far to say that he did more for psychology than any other single man. In the interval between his work and the birth of modern science, it cannot be said that any signal advance was made in psychological principles or method.

We may regard Descartes, Hobbes, and Spinoza as representatives of modern psychology in its earliest period. Hobbes and Spinoza are convinced of the concomitance and covariation of bodily process and mental, and they freely use this principle as a key to psychological problems. Both, and especially Spinoza, give prominence to association as enabling them to reduce the complexity of mental life to relatively simple constituents, and to show how these come to be combined. Yet neither of them is a pure associationist. They are

saved from pure associationism by the essential part which the conception of conation (conatus) plays in their systems. Thus neither lose sight of the teleological unity of mental life, though this is more prominent in Spinoza. Descartes began a line of inquiry which now belongs to physiological PSYCHOLOGY (q. v., physiological).

The main interest of Locke was not psychological. But in an incidental way he made valuable contributions to the subject, and his thorough-going attempt to exhibit all our knowledge as due to combination and relation of the relatively simple data of sense-apprehension and reflection exercised a powerful influence on subsequent psychologists. He himself did not give or attempt to give any precise account of the laws and forms of the process by which his simple data are elaborated. He invented the term 'association of ideas,' but made little use of the principle so named. Berkeley partly supplies this defect by his account of the perception of external things, and our knowledge of the material world in general, as due to association of relatively simple sensory data. In this respect his theory of vision is important as a starting-point for modern genetic accounts of the perception of spatial relations. Hartley and Hume, and later the two Mills, bent on explaining all mental products as the result of the interaction of assignable factors according to laws capable of definite formulation, make use of the principle of association as the one key to all problems (see ASSOCIATIONISM). Hartley combines this with a thorough-going application of the principle of psychophysical parallelism and a most interesting theory of neural vibrations as the correlates of psychical processes and dispositions. In Germany, Herbart, with a similar ideal of scientific explanation, introduces other forms of interaction besides that of associative combination, in particular psychical arrest or inhibition. He also introduces the conception of psychical systems or 'masses' which act and are acted on as wholes. Further, he refers the fading away of presentations from consciousness to arrest, so that their disappearance is a transformation into unconscious tendencies, which rise again into consciousness when arresting conditions are removed. Thus he is enabled to make an extensive and systematic use of unconscious factors in explaining the course of mental life. Finally, we owe to him the first thorough-going attempt to trace the origin and development of our apprehension of spatial and temporal relations.

We now come to what is termed the 'new' psychology. The work of such men as Hartley, James Mill, Bain, Condillac, Herbart, and Beneke had gradually given more definite and specific shape to psychological questions, so that more precise, detailed, and extensive use of empirical material became both needful and possible for their solution. In the main these writers confined themselves to the facts of every-day life collected from examination of the contents and processes of their own minds and from observation of other men. But their industry brought psychology to a point at which it could utilize manifold new sources of information. Access to these has mainly been opened out to it by the progress of science in general. The modern development of the physiology and pathology of the nervous system and the organs of sense has been of great importance in this respect. Compare, for instance, Hartley's theory of vibration with the physiological psychology of Wundt. Biology, too, has made a most important contribution. The movement of thought, which virtually commenced with Darwin, has brought into effective operation that genetic method in psychology of which we find preliminary hints in Aristotle. As examples of this line of inquiry, we may cite Darwin's own book on the *Expression of the Emotion* and parts of his *Descent of Man*; Spencer's general account of psychical evolution in the ascending scale of animal life, which forms perhaps the most valuable part of his *Principles of Psychology*; and the detailed researches of Romanes, Ll. Morgan, Dahl, Wasmann, Bethe, Mills, and others.

Another field for genetic inquiry has been opened up in connection with anthropological investigations. We are already beginning to study and compare the manifestations of mind in uncivilized and barbaric peoples (Völkerpsychologie). Sociology is also beginning to receive attention. It is becoming generally recognized that the development of the individual mind in human beings is essentially dependent on social relations; and the study of the conditions of social development both helps psychology and is helped by it. The work of such men as Tarde (*Lois de l'Imitation*, &c.), Baldwin (*Social Interpretations*), and Durkheim (*Le Suicide*, &c.), exemplifies this line of research. Another application of genetic method, which has not been specially suggested or facilitated

ab extra, consists in the study of the mental development of children, as embodied in such works as those of Preyer, Baldwin, Miss Shinn, Sully, and many others.

What is, however, generally regarded as the characteristic and distinctive feature of the 'new' psychology is the use of experimental methods analogous to those of physics and physiology. It is worth pointing out that one of the earliest and most successful of psychological experiments is due to a physicist —embodied in Wheatstone's invention of the stereoscope. As the pioneers of the general movement, we may mention Weber, Fechner, Helmholtz, and Wundt. At present, as we know, psychological laboratories are found throughout Europe and America. Perhaps some of the votaries of this method exaggerate its relative importance; but there can be no doubt that the results already obtained by means of it are of very great value. These directions and movements of research, except the genetic, are all well represented in the *Principles of Psychology* of W. James.

If, however, we were called on to assign the most important advantage the 'new' psychology has over the old, we should have no hesitation in saying that it does not consist in the introduction of any one new method or new kind of material. It lies rather in the convergence of manifold different lines of inquiry, capable of yielding each other help, guidance, and verification. Among these, the old way of procedure by collecting, sifting, and systematizing the facts of mental life as observable in ordinary every-day experience still retains, and always must retain, its place. No one has found it possible to write a systematic psychology without it. (G.F.S.)

See the other topics PSYCHOLOGY; also GENETIC, CHILD, RACE, SOCIAL, INDIVIDUAL, VARIATIONAL, COMPARATIVE PSYCHOLOGY, PSYCHOPHYSICS; and cf. ANTHROPOLOGY, BIOLOGICAL SCIENCES, MORAL SCIENCES, SCIENCE, ETHICS, SOCIOLOGY, PSYCHICAL RESEARCH, and PSYCHIC AND PSYCHOLOGICAL.

Literature: SIEBECK, HARMS, DESSOIR, each entitled Gesch. d. Psychol.; the Histories of Philosophy, passim; arts. Psychology in the Encyclopedias (Encyc. Brit. especially, by Ward); VILLA, Psicol. Contemp. (1898; Eng. and Ger. trans., 1901–2); BALDWIN, Psychol., Past and Present, Psychol. Rev., ii; see also the other topics PSYCHOLOGY, and BIBLIOG. G, 1, *b*. Of recent comprehensive works, besides those already referred to, the Psychol. Descrip. and Explan. of LADD, the Analytic Psychol. of STOUT, and the Handb. of Psychol. of BALDWIN, are mainly introspective; so also the treatises of BRENTANO, HÖFFDING, LIPPS, PAULHAN, and FOUILLÉE; the Physiol. Psychol. of WUNDT, the Physiol. Psychol. of LADD, the Psychol. physiol. of SERGI, the Grundzüge d. exper. Psychol. of KÜLPE, and the incomplete Psychologie of EBBINGHAUS, together with the laboratory works, Course in Exper. Psychol. of SANFORD, and Laboratory Manual of TITCHENER, are physiological and experimental. The genetic point of view is prominent in the Lehrb. d. Psychol. of JODL and the Manual of Psychol. of STOUT. The general works of VOLKMANN, DEWEY, REHMKE, HÖFLER, and MÜNSTERBERG represent epistemological points of view. A Bibliothèque intern. de Psychologie expérimentale of fifty small volumes is appearing, edited by Toulouse (vols. i–iii, 1900–1). Most of the general works contain bibliographies. (J.M.B., G.F.S.)

Psychology (biblical): see BIBLICAL PSYCHOLOGY.

Psychology (classification of topics in). The arrangement of the headings of psychological science on logical principles and for convenience of reference (as, for example, in the construction of bibliographical lists).

The following scheme is taken by permission from the *Psychological Review*, viii. 1 (Jan., 1901). It is used in the *Psychological Index*, vii, for 1900 (March, 1901). We quote from the introductory remarks of the editors of the *Psychological Review* (loc. cit.). (J.M.B.)

'The responsible editors of this *Review* drew up for the purposes of the *Psychological Index* the classification of psychological material which has been used heretofore in that publication. The co-operation effected with the German and French reviews emphasized the need of a common scheme, and Professor Warren represented the *Review* in a conference held in Paris during the recent International Congress (1900). The agreements reached, together with certain alterations subsequently suggested, are now embodied in the following scheme. It is thought that this scheme—having thus the authority of an international committee, and embodying the opinions of experienced bibliographers of psychology—may have value for the wider use of public and private libraries, and we recommend it to all those who are interested in psychological classification. That it avoids all difficulties and inconsistencies, we do not

pretend to say; it embodies compromises and considerations of utility.

'In the division headings two alternative schemes are presented: the "graded numerals" and the "decimal system." The *Index* continues to use the former; but others who wish to adopt the classification may prefer to use the decimal system.'

SCHEME OF CLASSIFICATION.

I. General . . . . . 0·
1. Textbooks and Systematic Treatises 0·1
2. General Problems, Methods, Terms, and Apparatus . . . . 0·2–0·5
3. History and Biography . . . 0·6
4. Collections, Proceedings, Dictionaries, Bibliographies . . . 0·7

II. Anatomy and Physiology of the Nervous System . . . 1·
1. General . . . . . 1·0
2. Nerve Elements . . . . 1·1
3. Brain and its Functions . . 1·2
a. Anatomy of the Brain . . 1·21
b. Physiology of the Brain . . 1·22
4. Spinal Cord, Nerves, and Sympathetic System . . . . 1·3
5. Reflex and Automatic Functions . 1·6
6. Pathological Anatomy . . . 1·8

III. Sensation . . . . . 2·
1. General; Synaesthesia . . . 2·0
2. Sense Organs (General) . . . 2·1
3. Psychophysics (Weber's Law, &c.) 2·2
4. Psychometry (see Time Relations, IV. 6) . . . . . 2·3
5. Vision and Ocular Motor Functions 2·4
a. General . . . . . 2·40
b. Anatomy and General Physiology of the Eye . . . 2·41
c. Physics and Special Physiology of Vision (Dioptrics, Adaptation, Refraction, Accommodation, Acuteness of Vision, Perimetry, &c.) . . . 2·42
d. Visual Sensations . . . 2·43
e. Special Phenomena of Vision (After-images, Contrast, &c.) 2·44
f. Eye Movements and Binocular Vision . . . . 2·46
g. General Pathology of Vision . 2·48
6. Hearing . . . . . 2·5
a. General . . . . . 2·50
b. Anatomy of the Ear . . 2·51
c. Physics and Physiology of Hearing . . . . 2·52
d. Auditory Sensations . . 2·53
e. General Pathology of Hearing 2·58
7. Other Senses . . . . 2·7
a. Taste and Smell . . . 2·71–2·72
b. Cutaneous, Pressure, and Joint Senses . . . . . 2·73
c. Muscle Sense and Muscles . 2·74
d. Static Senses (Position, Equilibrium, and Dizziness) . 2·75
e. Organic, Pleasure and Pain Senses; General Sensibility . 2·76
f. Miscellaneous Senses . . 2·77
8. General Pathology of Sensation . 2·8

IV. Characters of Consciousness . 3·
1. General . . . . . 3·0
2. Attention, Apperception, and Selection . . . . . 3·1
3. Association . . . . . 3·2
4. Habit, Accommodation, and Adaptation . . . . . 3·3–3·4
5. Work and Fatigue . . . 3·5
6. Time Relations of Consciousness; Mental Chronometry . . . 3·6

V. Cognition . . . . . 4·
1. General . . . . . 4·0
2. Perception and Idea; Reading . 4·1
3. Perception of Time, Space, and Motion . . . . . 4·2
4. Memory and Imagination (see also Dreams, IX. 1) . . . . 4·3
5. Judgment and Belief; Reasoning . 4·4
6. Reflection and Self-consciousness . 4·5
7. Normal Illusions and Normal Suggestion . . . . . 4·6
8. General Pathology of Cognition . 4·8

VI. Affection (Feeling and Emotion) . 5·
1. General; Pleasantness and Unpleasantness . . . . . 5·0–5·2
2. Emotion and its Expression . . 5·3
3. General Pathology of Feeling . 5·8

VII. Conation and Movement . . 6·
1. General; Dynamogenesis and Inhibition . . . . . 6·0
2. Organs of Movement (see Muscle Sense, III. 7, *c*) . . . . 6·1
3. Instinct and Impulse (Imitation, Play, &c.) . . . . . 6·2–6·4
4. Special Motor Functions . . 6·5
a. Language and Song . . 6·51
b. Handwriting and Drawing . 6·52
c. Walking . . . . 6·53
d. Other Motor Functions (see also Eye Movements, III. 5, *f*) 6·57
5. Volition and Effort . . . 6·6
6. Freedom of the Will . . . 6·7
7. General Motor Pathology . . 6·8

VIII. Higher Manifestations of Mind 7·
1. Logic and Science; Methodology . 7·1
2. Ideals and Values . . . 7·2
3. Theory of Knowledge . . . 7·4
4. Aesthetics . . . . . 7·5
5. Ethics . . . . . 7·6
6. Religion . . . . . 7·7

IX. Sleep, Trance, and Pathology . 8·
1. Sleep and Dreams . . . 8·1
2. Hypnosis and Trance States . 8·2
3. Psychical Research . . . 8·3
4. Pathology, General Discussion . 8·4
5. Nervous Disease . . . . 8·5
a. General . . . . . 8·50–8·51
b. Neurasthenia and General Paralysis . . . . 8·52
c. Epilepsy and Hysteria . . 8·53
d. Other Neuroses . . . 8·57
6. Mental Disease . . . . 8·6
a. General (Insanity) . . 8·60
b. Idiocy, Imbecility, &c. . . 8·62
c. Other Special Psychoses . 8·67
7. Medical Jurisprudence . . . 8·7

X. Genetic, Individual, and Social Psychology . . . . 9·
1. Evolution and Heredity . . 9·1
2. Comparative Psychology . . 9·2

3. Mental Development . . . 9·3
a. General; Adolescence and Senescence . . . 9·30
b. Child Psychology . . . 9·31
c. Pedagogy . . . 9·32
4. Individual, Sex, and Class Psychology . . . . . 9·4
5. Folk Psychology . . . . 9·5
6. Social Psychology . . . . 9·6
7. Race Pathology . . . . 9·8
a. Criminology . . . . 9·81
b. Degeneration . . . . 9·82

Psychology (empirical, rational): Ger. *empirische, rationale Psychologie*; Fr. *psychologie empirique, rationnelle*; Ital. *psicologia empirica, razionale.* Empirical psychology is psychology from which problems of metaphysics and epistemology are excluded; that is, PSYCHOLOGY as defined under that topic, and pursued by inductive and experimental methods. Rational psychology is the department of philosophy which deals with the nature of the mental principle in its relation to other forms of being, having such subordinate problems as the relation of MIND AND BODY (q. v.), the validity of knowledge (see EPISTEMOLOGY, 2), &c.

The distinction is rapidly going out of use, since the matter of rational psychology is being taken up by philosophy and epistemology, and the term psychology left to the other meaning. In theology, however, psychology of the 'rational' sort—often called pneumatology—is treated as a branch of theological ANTHROPOLOGY (q. v.; the theory of man in relation to God), of which somatology (theory of the body) is the other branch (cf. BIBLICAL PSYCHOLOGY). (J.M.B.)

Psychology (experimental): Ger. *experimentelle Psychologie*; Fr. *psychologie expérimentale*; Ital. *psicologia sperimentale.* Experimental psychology may be defined as that PSYCHOLOGY (q. v.) or branch of psychology which employs experimental methods and appliances in its investigations.

The phrase seems to have been first used by Wundt (*Beitr. z. Physiol. d. Sinneswahrn.*, 1862), who, in the introductory paragraphs of the *Physiologische Psychologie* (1874 and 1893), practically identifies experimental with physiological psychology. 'If we lay stress on peculiarity of method,' he says, 'we may call our science experimental psychology, as contradistinguished from the older doctrine of mind, of which the sole foundation was introspection.'

There is great difference of opinion in detail as to the meaning and application of the term 'experimental.' Some psychologists restrict the efficacy of the experimental method to the simple mental processes; others declare that the whole of mind is accessible to experimental investigation. Some make experiment the check and control of introspection; others would replace introspection by experiment. Some assert that no observation is experimental whose results cannot be quantitatively expressed; others deny the possibility of quantitative work in psychology. Controversies upon such questions are natural in a young science, and more especially in a science whose subject-matter touches general human interests so closely. Their resolution must be left to time. (E.B.T.)

In France—and the usage is becoming more general—experimental psychology is used simply for psychology separated from metaphysics and treated by positive methods; it is an experimental science in the sense of being empirical and inductive. In this sense the chair of Psychologie expérimentale in the Sorbonne is named. (L.M.–J.M.B.)

A more restricted usage is also current in English, and in some degree in German, which limits experimental psychology to the method of experimenting which does not involve the organic physiological processes; this latter sphere of experiment, i. e. through the internal organs and processes, being called physiological psychology. This is substantially the same distinction as that between 'external' and 'internal' psychophysics mentioned under PSYCHOLOGY (physiological). (J.M.B.)

An early piece of psychological experimentation is Weber's investigation into touch and common feeling (1846: see HAPTICS); but scattered psychological experiments may be found in the works of such men as Bonnet, Tetens, Wheatstone. Weber's example has been followed by Fechner, A. W. Volkmann, Helmholtz, and Wundt in Germany, and by many others, more recently, in other countries. Several journals—the *Philos. Stud.* (1881 ff.), the *Zeitsch. f. Psychol.* (1889 ff.), the *Amer. J. of Psychol.* (1887 ff.), the *Psychol. Rev.* (1894 ff.), and the *Année Psychol.* (1895 ff.), in particular—devote much of their space to experimental psychology; and of the older journals, *Mind* and the *Rev. philos.* have published many experimental papers. Cf. LABORATORY AND APPARATUS, and the other topics PSYCHOLOGY. (E.B.T.)

Literature: FECHNER, Elemente d. Psychophysik (1860; repr. 1889, with bibliog. of Fechner); MÜLLER, Grundlegung d. Psycho-

physik (1879); HELMHOLTZ, Physiol. Optik (1st ed., 1867); Tonempfindungen (1st ed., 1862); KÜLPE, Grundriss d. Psychol. (1893); Arch. f. Gesch. d. Philos., vi; Philos. Monatsh., xxx; JAMES, Princ. of Psychol., i (1892); WUNDT, Essays (1885), 127 (also as cited above); TITCHENER, Outline of Psychol. (1896), and Exper. Psychol. (1901–); RIBOT, Ger. Psychol. of To-day (Eng. trans.); BINET, Introd. à la psychol. expér. (1894); SCRIPTURE, The New Psychol.; MÜNSTERBERG, Beitr. z. exper. Psychol. (1889 ff.); EBBINGHAUS, Grundz. d. Psychol. (1897–); VILLA, Psicol. contemp. (1898); SANFORD, Course in Exper. Psychol., Sensation and Perception (1898). See BIBLIOG. G, 1, *d*.

See the other topics PSYCHOLOGY, PSYCHOPHYSICS, and REACTION TIME. Cf. also the experimental topics ATTENTION, MEMORY, MOVEMENT, OPTICAL ILLUSIONS, SENSATION, and the various special sensation headings. (E.B.T.–J.M.B.)

Psychology (physiological): Ger. *physiologische Psychologie*; Fr. *psychologie physiologique*; Ital. *psicologia fisiologica*, or *psicofisiologia*. The new psychology took shape from the confluence of two streams of work, the psychophysical and the physiological. Weber was early among the experimentalists; Fechner is called the father of psychophysics. Over against these men, on the physiological side, stands Lotze, with the *Medicinische Psychologie* (1852). Wundt combines the 'external psychophysics' of Fechner with the 'mental physiology' (internal psychophysics) of Lotze. His *Physiologische Psychologie* (four editions, 1874) defines the problem of physiological psychology as follows: 'It has, first, to investigate those vital processes which, standing midway between external and internal experience, require the simultaneous application of both methods of observation, the external and the internal; and secondly, from the point of view which it has gained in the investigation of these processes, to survey the whole realm of vital phenomena, and so, if possible, mediate a comprehensive theory of human existence.' Wundt makes no distinction between physiological and experimental psychology.

Rudiments of a physiological psychology can be found far back in the history of philosophy. Hobbes, in particular, is prominent in this regard among English philosophers. The sub-title of Lotze's work is *Physiologie der Seele*, and it was translated into French as *Principes de psychologie physiologique* [yet the name is to be found earlier, in Chardel's *Essai de psychologie physiologique*, 1837—TH.Z.]. Carpenter speaks of mental physiology (1867), Maudsley of the physiology of mind (1874). Wundt used the phrase in 1874, as a matter of course. Ladd (*Elements of Physiol. Psychol.*, 1888) defines it as 'psychology approached and studied from the "physiological" side or point of view.' Ziehen (*Introd. to Physiol. Psychol.*, 1892) gives the following scheme:

(1) Speculative psychology.
(2) Empirical psychology.
  (*a*) Autonomic (psychical process without concomitant cerebral).
  (*b*) Physiological (psychical process with concomitant cerebral; integral part being metric physiological psychology, or psychophysics).

This classification has not, however, found any general acceptance. The fact is (cf. PSYCHOLOGY, the new) that the stream of thought running through Flourens (1842), Broca (1863), Fritsch and Hitzig (1870), Ferrier (1873), Munk, Goltz, Luciani, Tamburini, Horsley, Flechsig (*Gehirn u. Seele*, 1894), Exner (*Entwurf zu einer physiol. Erklärung d. psych. Processe*, 1894)—the physiological stream proper—has joined with the psychophysical stream to constitute modern psychology at large. Hence while individual authors may, for pedagogical purposes, classify and distinguish the new psychology, experimental psychology, physiological psychology, psychophysics, psychophysiology, &c., there is really no sharp line of demarcation to be drawn. It is significant that Sergi's work, published in 1879 in Italian as 'Elements of Psychology,' should appear in the French edition of 1888 as a 'Physiological Psychology.' Ebbinghaus' psychology might equally well be entitled either experimental or physiological psychology. (E.B.T.)

In France the tradition comes down from Descartes and Malebranche, through a series of medical authorities of the first rank—Cabanis, Esquirol, Maury, &c. The Société médico-psychologique preserved this tradition, and its influence was marked upon the work of Taine. More recently the pathological school—Charcot, Beaunis, Gley—have brought this movement into union with the two other great streams mentioned above, notably through their work in aphasia, hypnotism, disorders of personality, &c. (L.M.)

For a more restricted definition of physiological psychology—in the sense of the 'external psychophysics' of Fechner, mentioned

above—see PSYCHOLOGY (experimental). A note on the history of instruction in laboratory psychology is given under LABORATORY AND APPARATUS, I. Apart from work done under other names, especially in medical schools, possibly the earliest courses in physiological psychology proper, with demonstrations of brain anatomy and physiology, were those of James (about 1880) at Harvard, and McCosh, Osborn, and Scott at Princeton (1883). Cf. the other topics PSYCHOLOGY.

Literature: the works cited above; BIBLIOG. G, 1, *d*; see also PSYCHOLOGY (experimental). (J.M.B.)

Psychology (rational): see PSYCHOLOGY (empirical, &c.).

Psychology (the new): Ger. *die moderne Psychologie*; Fr. *la psychologie nouvelle*; Ital. *la nuova psicologia*. Modern psychology, in its experimental and physiological aspects; scientific as opposed to philosophical psychology. So we speak of the new physiology of Ludwig; the new pathology of Virchow; the new chemistry of Liebig.

The dividing line between the old and the new psychology may perhaps be found in the psychology of Herbart, who overthrew the psychology of faculties, while he still held fast to a metaphysical basis for psychology. Most of the prominent living psychologists have been strongly influenced by the 'new' psychology, even if they are not primarily experimentalists. So Brentano, Lipps, Jodl, Bain, Höffding, Ladd, James, Baldwin, Sully, Ward, Stout, Stanley Hall, Ribot, Paulhan, Fouillée, Rehmke, Ardigò, Sergi, Morselli, &c. (E.B.T.)

It is probable that the movement was prepared for by the British associationists and empirical thinkers, of whom J. S. Mill and Spencer may be especially mentioned (cf. Ribot, *Psychol. angl. contemp.*). With this movement note should also be made of the French school of mental pathologists (Charcot, Pierre Janet), whose methods and results are vitally incorporated in the body of the 'new' psychology. Cf. the other topics PSYCHOLOGY. (L.M.–J.M.B.)

Psychometry [Gr. *ψυχή*, soul, + *μέτρον*, a measure]: Ger. *Psychometrie*; Fr. *psychométrie*; Ital. *psicometria*. This term has been used as synonymous with experimental psychology or exact psychology. If retained at all, it is best confined to the department concerned with the measurement of the time of psychophysical and mental processes. See REACTION TIME. (J.McK.C.)

It has been taken over by a form of new mysticism, and had better be abandoned by scientific psychology. The term Psychometrie was used by Wolff (*Psychol. Emp.*, § 522) for the mathematical treatment of psychological processes. (J.M.B., H.C.W.)

Psychomotor: Ger. *psychomotorisch*; Fr. *psychomoteur*; Ital. *psicomotore* (*-torio*). Applied to action considered as following upon a mental state. See IDEO-MOTOR, and SENSORI-MOTOR; and cf. DYNAMOGENESIS. (J.M.B.)

Psychoneurosis: see PSYCHO-.

Psychonomic Forces. FORCES (q.v., figurative meanings) (1) which condition mental development, or (2) which, being of the psychological order, enter into and determine social change. The theory of these forces constitutes PSYCHONOMICS (q.v., also for derivation and equivalents). (J.M.B.)

Psychonomics [Gr. *ψυχή*, mind, + *νόμος*, law]: Ger. *Psychonomik*; Fr. *psychonomique*; Ital. *psiconomia* (these equivalents are suggested). Suggested to designate (1) that branch of science which investigates the relation of the individual mind to its (especially social) environment, after analogy with BIONOMICS (q. v.) and SOCIONOMICS (q. v.); and (2) that branch of SOCIOLOGY (q.v.) which deals with the psychological factors and laws involved in social organization and development.

This branch of inquiry treats, from the objective or sociological point of view, the data with which SOCIAL PSYCHOLOGY (q.v.) deals from the subjective or psychic point of view. (J.M.B., F.H.G.)

Psychoparesis: see PSYCHO-.

Psychopathology [Gr. *ψυχή*, soul, + *πάθος*, disease]: Ger. *Psychopathologie*; Fr. *psychopathologie*; Ital. *psicopatologia*. The general study of diseased mental conditions; a synonym of psychiatry and abnormal psychology, but rather more comprehensive than either, because it emphasizes the general scientific study of all forms of mental aberration. Its more precise synonym is mental PATHOLOGY (q.v.). See PSYCHOSIS (2).

As compared with abnormal psychology it emphasizes the pathological, while the latter term emphasizes the psychological point of view; nor does it as prominently as the latter term consider minor mental deviations. As a type of a treatise with this title see Emminghaus' *Allgemeine Psychopathologie*. The term psychopathist is occasionally met with as synonymous with psychiatrist. Psychopath is occasionally used, as synonymous with neuropath or neurotic, to indicate an

individual of abnormal mental make-up, but not necessarily insane. The use of psychopathology for psychotherapeutics or mind-cure is not correct. (J.J.)

Psychophysical Apparatus: see LABORATORY AND APPARATUS.

Psychophysical (Measurement) Methods: Ger. *psychophysische Massmethoden*; Fr. *méthodes psychophysiques*; Ital. *metodi psicofisichi*. Methods for studying the relation between stimuli and sensations and the accuracy of perception; used more especially in the case of the measurement of intensity.

The methods are divided by Wundt into gradation methods and error methods. The gradation methods are the method of least noticeable difference and the method of mean gradation. The former, originally used by Weber, determines for different stimuli the difference in intensity or size that can just be noticed. The latter, introduced into psychology by Plateau, finds a stimulus apparently midway between two others. The error methods are the method of average error and the method of right and wrong cases. By the former, first used by Fechner and Volkmann, one stimulus is adjusted until it appears to be the same as another, and the average error in a series of trials is calculated. By the latter, suggested by Vierordt, two stimuli are presented differing by a small amount, and the observer decides which appears to be the greater. All the methods give a constant error and a variable error. In order to separate these errors and to secure reliable results, various precautions must be regarded, which are discussed at length in the extensive literature relating to the subject. Cf. ERRORS OF OBSERVATION, FECHNER'S LAW, WEBER'S LAW, and PROBABILITY. Discussion and references to the literature will be found in Fechner's *Elemente der Psychophysik* (1860) and subsequent works, and in Wundt's *Physiologische Psychologie*. (J.MCK.C.)

Literature: WEBER, Annotationes de Pulsu, Resorptione, Auditu et Tactu (1834); Der Tastsinn u. das Gemeingefühl, in Wagner's Handb. d. Physiol., III. ii (1846); and Annotationes Anatomicae et Physiologicae (Lipsiae, 1851); FECHNER, Zend-Avesta (1851); Elemente d. Psychophysik (1860); In Sachen d. Psychophysik (Leipzig, 1877); and Revision d. Hauptpunkte d. Psychophysik (1882); WUNDT, Grundzüge d. physiol. Psychol. (4th ed., 1893); Ueber die Methode d. Minimaländerungen, Philos. Stud. (Leipzig, 1883); G. E. MÜLLER, Grundlegung d. Psychophysik (1879); RIBOT, German Psychol. of To-day (Eng. trans., 1886); JASTROW, A Critique of Psychophysical Methods, Amer. J. of Psychol. (1888), i. 271; FULLERTON and CATTELL, On the Perception of Small Differences (1892); KÜLPE, Outlines of Psychol. (1895); EBBINGHAUS, Grundzüge d. Psychol. (1897–); VILLA, Psicol. Contemp., chap. iv. (J.MCK.C.–J.M.B.)

Psychophysics [Gr. ψυχή, soul, + φυσικός, physical]: Ger. *Psychophysik*; Fr. *psychophysique*; Ital. *psicofisica*. The term has been used as synonymous with experimental and physiological psychology. Better usage, however, confines it to that department treating the relations of physical stimuli to sensations, more especially their relations of intensity. Cf. FECHNER'S LAW, and WEBER'S LAW; and see PSYCHOPHYSICAL METHODS (also for literature).

The adjective 'psychophysical' is used in a somewhat wider sense, to designate the relation between mind and body. (J.MCK.C.)

Psychophysiology: see PSYCHO-.

Psychosis [Gr. ψύχωσις, a giving of life or soul, animating]: Ger. *Psychose*; Fr. *psychose*; Ital. *psicosi*. (1) Used with regard to normal processes, psychosis is equivalent to the mental or psychical element in a psychophysical process, just as neurosis refers to that aspect of the process which belongs to the nervous system. The term simply designates this factor without implying any theory of relation of the mental to the physical (see Huxley, *Automatism*, 1874, and elsewhere).

(2) Used as equivalent to the total state of consciousness existing at any one moment (see Stout, *Manual of Psychol.*, 71). In Ladd (*Psychol., Descrip. and Explan.*, 661) the term is a general designation for all concrete psychic facts. (J.J.–J.M.B.)

(3) Used pathologically (and in this sense the usage is rapidly gaining ground both in foreign and in English literature), the term designates an abnormal mental condition, especially inasmuch as it is correlated with a specific disease-process (a 'disease-entity,' if the term be allowed) with characteristic origin, course, and symptoms. The typical forms of insanity which can be scientifically differentiated would rank as psychoses in this sense.

It may be useful to illustrate the nature of a disease as a pathological process of definite etiology, typical manifestations, characteristic course and termination. Thus typhoid fever is a disease produced by an infection of the intestinal tract by a specific bacillus, proceeding as a swelling, necrosis, and healing of the affected parts, with a consequent auto-intoxi-

cation due to the abnormal parasitic presence or symbiosis. So, too, diabetes, although no definite cause of it is known, is a disease, because it presents recognizable criteria (non-elaboration of the sugar in the blood, and its elimination with the urine), and presents a fairly definite course and complex of symptoms. Hemiplegia, however, although a definite symptom-complex, is not a disease, but a residual, due to the transitory or permanent interruption of the cerebral efferent pathway. The disease-process leading to it is usually a vascular disorder, either at the point of damage, as in hemorrhage or thrombosis, or in the heart or aorta, as in embolism.

A further distinguishable type of pathological abnormality is represented by the disorders produced by abnormal development; these may be due to conditions of the environment, or may be irregularities of the balance of function of special organs (such as cretinism and myxoedema due to disease of the thyroid gland), and yet in other instances we have no factor to account for the abnormality except that of heredity. The fundamental purpose of pathology (i. e. the study of abnormal life, not merely morbid anatomy and bacteriology) is a recognition of actual disease-processes and of the natural relation of symptoms.

The introduction into psychiatry of the principle of pathology, that the study of the natural development and causal relation of symptoms should replace the speculative analysis of single features (e. g. 'delusions on special topics,' hallucinations, or more complex groups of symptoms, like excitement, depression, &c.), was mainly due to Kahlbaum, and has been notably furthered by Kraepelin and his followers. For this purpose the effort to determine definite disease-processes in psychiatry is undoubtedly the most fruitful and helpful method, although it is not so easy to pursue as in the disorders of the non-psychic mechanisms. It seems possible to distinguish the following types:

(*a*) Aberrations in growth and fundamental development (*a*) not of the character of a real disease-process, but referable to poor heredity (Anlagen) and unfortunate external conditions of growth, or (*b*) due to actual disease-processes, affecting the brain directly or indirectly (traumatism at birth, meningitis, encephalitis, &c.).

(*b*) Disease-processes of an etiologically vague character, called constitutional, but of remarkably well-defined symptomatological and clinical nature: epilepsy, hysteria, constitutional neurasthenia, manic-depressive insanity (mania and melancholia), and paranoia.

(*c*) Disease-processes on the basis of an intoxication (alcoholism, cocainism, morphinism), or exhaustion, or auto-intoxication (myxoedematous insanity and general paralysis), and yet others which depend on unknown consequences of developmental and involutional irregularities, especially in the sexual sphere: as perhaps the processes of deterioration, dementia praecox, and certain forms of paranoic condition, and, in the period of involution, of melancholia, &c.

(*d*) As residuals may be classed the terminal dementias, certain paranoic conditions, recovery without insight into the morbidity of abandoned delusions, &c., comparable to the formation of scars and defective readjustment after the active disease-process has disappeared.

At first sight this general biological outline may appear unimportant to the psychologist; but disregard of such principles is bound to lead to serious misconceptions in the valuation of the current nomenclature of mental diseases in the psychiatric literature and in the actual problems of psychopathology. A short discussion of this point seems warranted by the recent introduction of psychophysical and psychological methods into psychiatry and the resulting reaction upon normal psychology. We must distinguish the following groups of concepts:

(i) The elementary abnormal symptoms: disorders of sensation (including hallucinations), of memory, of the stream of thought, of elaboration of impressions (orientation), of attention (indifference or distractibility), of self-direction, of various states of consciousness, activity (inhibition, retardation, or facilitation), &c.

(ii) The symptom-complexes, i. e. sufficiently frequent combinations of symptoms to form definitely recognized groups or pictures, such as the symptom-complexes of exaltation (as in mania), depression (as in melancholia), delusional states with only little or no formal disorder (paranoia), or confusion, and delirium. Most of the descriptions of mental diseases published are mainly descriptions of symptom-complexes, many of which cannot make any pretensions to be recognized as disease-entities. For sketches of these symptom-complexes see MANIA, MELANCHOLIA, MORAL INSANITY, and PARANOIA.

(iii) Pathological anatomy furnishes complexes of manifestations which are frequently called 'pathology,' but are not necessarily more characteristic of the disease-process than the symptom-complexes which can be ascertained before death, although in the present state of biology its data appeal to many medical minds more than the less permanent and tangible ante-mortem symptom-complexes, which are all the more apt to be used loosely, because they are so similar to what we experience in normal life, and do not, at first sight, require many critical checks against fallacies of common sense.

(iv) The fundamental aim of a scientific study of mental diseases is, however, to study the special symptoms and symptom-complexes in the course of the disease, with a view to determine the disease-process or disease-principle underlying the whole complex of deviations from the normal. Considering the variability of the symptoms in individual attacks and in different persons, we depend for the definition of the disease-principle on the conditions of origin (etiology), the general course of the disease and its termination, and the fundamental features which are present in every case of a disease-entity, and lie at the bottom of the various forms of manifestations in the psychic, 'physiological,' and anatomical spheres.

The study of fundamental symptoms demands two series of psychophysical studies:

(*a*) A knowledge of individual variations (Variational Psychology, q. v.) adapted to the needs of mental pathology.

(*b*) A knowledge of new modifications of reactions introduced by any definite disease-process in analogy with the study of the psychophysical reaction to poisons, to exhaustion, to the strain of powerful emotions, &c. Only in this way shall we learn to know the symptomatic *equivalents* of a certain disease-process.

For the purposes of psychopathology it is not sufficient to speak of a 'case of mania or melancholia,' but it is necessary to give definite data as to the disease-type in order that the results may be of comparative value. Our present ignorance of the disease-process in numerous instances met in practice does not alter the stringency of this requirement. Its recognition dictates the policy of beginning more serious work with the known *fundamental* deviations, and then proceeding to the study of the symptom-complexes, and especially of the elementary symptoms, so far as they can be traced in their evolution. Ordinary clinical psychopathology offers many a warning. That Clouston calls about 50 per cent. of all admissions to his hospital cases of mania, while Garnier so describes only 6 per cent. of the Paris admissions, or Forel 8 per cent., is an illustration of the fallacies of psychiatric nomenclature. A demonstration of the insufficiency of a symptomatic nomenclature is seen in general Paralysis (q. v.), where the most varying symptoms may superficially dominate the picture, or katatonia, where the repeated shifting of symptom-complexes would force us to accept the presence of three or four or more successive 'diseases.' We cannot insist enough on the principle followed by modern psychiatry: that it is not an attempt to unite mental disorders into such pictures as will above all appear plausible from the point of view of systematic psychology, but rather the collection and digestion of facts with a view to a broad pathology of human life, reserving for itself the right of working out a system of psychology planned according to its own requirements.

Literature: the best historical statement of this problem is Kahlbaum, Die Gruppirung der psychischen Krankheiten und die Eintheilung der Seelenstörungen (1863). The best modern presentation of psychiatry, and one which does justice to the above-mentioned principles, is Kraepelin, Psychiatrie (1899). An excellent exposition is by August Hoch, The Study of Psychiatry, Amer. J. of Insan., Oct. 1900. (A.M.)

Psychostatics: see Psycho-.

Psychotherapeutics or **Psychotherapy** [Gr. ψυχή, soul, + θεραπεύειν, to heal]: Ger. *Psychotherapie*; Fr. *psychothérapie*; Ital. *psicoterapeutica*. The treatment of disease mainly or wholly by direct and indirect appeal to or utilization of the influence of mental conditions upon bodily states.

The term serves a useful function as the equivalent of the legitimate factor in the scientific treatment of disease, which utilizes and directs, examines and interprets such mental influences. There are many more or less extreme systems which depend upon similar principles, but present them under unwarranted and fantastic theories, or combined with irrelevant notions and practices. Some of these are noticed under Faith Cure and Mind Cure (q. v.).

The recognition of the mutual influence of mind and body is one of the fundamental tenets of modern psychology. That bodily

states condition mental processes is abundantly proven by the existence of mental diseases traceable to degenerations of specialized parts of the central nervous system, by the action of drugs, by the mental results of fatigue and ill health and of bodily injuries, by an endless series of every-day observations, and by the systematic experiments of the laboratory. That mental processes tend to have motor expression, and that concentrated attention or consciousness may interfere with the normal functioning of bodily processes, are evidenced in every-day matters by blushing, by the effect of embarrassment (upon speech), of fear (upon movement), of panic, of stage fright, of anxiety or nervousness (upon heart-beat or respiration), as in the moments preceding an appearance before the public. Witness the difficulty of swallowing a pill when too consciously intentioned. In extreme cases even death has been produced by fear or anticipation. Psychotherapeutics properly includes a recognition and utilization for purposes of treatment of all these factors.

One may recognize (1) a general psychotherapeutic effect, and (2) special psychotherapeutic treatment; in both of which the methods may be in various degrees direct or indirect. (1) Any general influences which affect the success of medical treatment, such as the inducement of confidence in the physician on the part of the patient, the assuaging of unreasonable fears, the general tranquillization of the patient by sympathy and encouragement or, it may be, by stern counsel and masterful direction, and by a congenial and carefree environment, are thus psychotherapeutic influences. Indeed, in this sense it seems proper to enumerate diversions and recreations, interesting occupations and changes of scene, congenial companionship, and any of the good events of life, as indirect, but at times important, psychotherapeutic aids. (2) But the associations of the term are in the main more specific. They refer, apart from definite systems and processes, to appeals to the imagination, to the impressive effects of mystic processes and elaborate procedures, to appeals to faith, to the efficacy of prayer, and, in short, to the production, in a manner suitable for each individual, of an attitude of hopefulness and confidence of recovery, which undeniably contributes to a convalescent tone of the nervous system. The patient who imagines that the placing of a thermometer in his mouth is a therapeutic procedure is distinctly benefited by this belief; the whirr and buzz of an electric machine, the imposing action of magnets, act on the same principle as sugar pills which are believed to be potent medicines, or as the conviction of faith in response to prayer. Such forms of action are classified as suggestion (cf. HYPNOSIS and SUGGESTION), and Suggestive Therapeutics becomes a proper term for systems which proceed upon this principle. Hypnotic suggestion is the most important of such systems, and is practised by not a few specialists in all countries; it is used in connection with ordinary medical practice by many more.

While the statistics of alleviation by this method are not uniform, there is sufficient evidence of the success of the method in a very considerable number of cases, as well as of its applicability in cases where other forms of procedure are less likely to succeed. Its most pronounced success is in the treatment of functional nervous disorders, of insomnia and hypochondria, of neuralgia, neurasthenia, pseudo-paralysis, perverse habits, such as the use of drugs (morphine, opium, chloral), motor troubles, such as choreic spasms, stuttering, occupation neuroses, and the like. The mere hypnotization is often of benefit, especially in cases of insomnia; and the anaesthesia thus produced has been utilized for surgical operations, both minor and severe. In addition, hypnotic suggestion has been helpful in a much wider range of diseases, in alleviating pain, in overcoming secondary impediments, and by contributing to a wholesome and tranquil mental tone. The claims sometimes urged that hypnotic suggestion is capable of removing organic disabilities cannot be substantiated (see HYPNOSIS, and HYPNOTISM, and literature there cited). The process involved in such treatment is an appeal to functions ordinarily beyond the reach of direct voluntary influences. The increased suggestibility of the hypnotic state offers a means of making an appeal to the deeper subconscious functions (see AUTOMATISM, and UNCONSCIOUS STATE). That similar effects can be produced by other appeals is altogether probable; and faith-cures and cures by relics and shrines, by prayer and 'divine healing,' present varieties of the same fundamental process. There are indications that psychotherapeutic methods, scientifically interpreted, will be generally and judiciously utilized in modern medicine, and not left for quacks and extremists to administer according to the precepts of irrational and dogmatic systems.

Literature: SCHRENK-NOTZING, art. Psychotherapie, in Real-Encyc. d. ges. Heilkunde (1898); ZIEHEN, art. Psychotherapie, in Eulenburg's Lehrb. d. Allg. Therapie, (1898), iii. 637–96; BERNHEIM, Suggestive Therapeutics (Eng. trans., 1889); TUKE, Illustrations of the Influence of the Mind on the Body (1884); TUCKEY, Psychotherapeutics (1889); REGIS, Origin and Progress of Mental Medicine, Alien. and Neur., xv. 4; GODDARD, Faith-Cures, J. of Psychiatry, x. 3 (1899); JASTROW, Fact and Fable in Psychol. (1900), 29–38, 171–80. See also references in DESSOIR, Bibliog. des Hypnotismus (1888), and Supplement (1890). (J.J., J.M.B.)

Ptolemaic Theory: Ger. *Ptolemäisches Weltsystem*; Fr. *système de Ptolémée*; Ital. *teoria Tolemaica*. The theory of the system of the world set forth by Ptolemy in his *Syntaxis*.

Its fundamental propositions are: (1) The earth is a globe. (2) This globe is at rest in the centre of the world, the latter being represented by the celestial sphere. (3) The heaven or world makes a diurnal revolution around an axis which passes through the centre of the earth. (S.N.)

Puberty [Lat. *pubertas*, age of maturity]: Ger. *Pubertät, Mannbarkeit, Geschlechtsreife*; Fr. *puberté*; Ital. *pubertà*. Age at which the generative organs become capable of function. At this time the sexual organs practically complete their development, and male and female characters are assumed—form of body, voice, beard, mental quality, &c.

In the human race it is commonly stated to be between the ages of fourteen and sixteen years in men, thirteen and fifteen years in women, although varying with race, climate, social position, &c. It is accompanied by important and subtle mental and emotional changes and ushers in the period of ADOLESCENCE (q. v.).

Literature: the literature of ADOLESCENCE (q. v.), especially MARRO; H. EMMINGHAUS, Die psychischen Störungen des Kindesalters 1897), 179 f. (C.F.H.–J.J.)

Public [Lat. *publicus*]: Ger. (1) *Gemeinwesen, Publicum*, (2) *öffentlich*; Fr. *public*; Ital. *pubblico*. (1) All or part of the people of a given community taken collectively; e.g. the 'reading public,' the 'voting public.' (F.H.G.–J.M.B.)

The conception of a public arose in Greece, as afterwards in Rome (and probably at an earlier time in Egypt and Babylonia), when it became necessary to take account in civic affairs of men not descended from tribes that founded the city, and therefore not belonging to patrician clans. The term is one of many that mark the transition from ethnic to civic organization—to civilization. In the English language, public has, from the earliest times, denoted *all* the people, without distinction of rank, relationship, or estate. Thus T. Elyot (*The Governour*, i. 1) makes publicke of equal extension with *populus*, in 'whiche worde is conteyned all the inhabitants of a realme or citie, of what estate or condition soeuer they be.' (F.H.G.)

(2) Pertaining to the people, e.g. open to (public news, press, &c.), administered by (public affairs, public institutions), suited or intended for (public acts), belonging to (public welfare), in the service of (public officer), the public (in sense 1). (J.M.B.)

Public and **Private** (in social psychology). That mental process or product which implicates more than one individual is, in so far, public; that which does not is private.

It is recommended that these terms have these meanings, replacing such loosely used terms as 'social' and 'individual.' Social psychology is the psychology of the individual and of society so far as they are public. It is an urgent problem to trace the public element in mental development.

Publicity is, therefore, that coefficient or signature attaching to a mental process or product which stamps it as having in it elements in the given sense public. And it is evident that, like so many other terms, it has two meanings, according as the psychic or the psychological point of view is taken (cf. PSYCHIC AND PSYCHOLOGICAL). Psychic or mental publicity involves the recognition, by the individual himself, of the implication of others in his mental state; he is conscious of its public reference (e.g. in shame or vanity). Thus Butler (*Sermons*, v) speaks of pity as a 'public affection.' Psychological publicity, on the contrary, may not involve such consciousness, but may coexist with psychic or mental privacy; such is, e.g., in the opinion of many psychologists, the consciousness of self. In other words, the psychologically public may be psychically IMMEDIATE (q. v.). Cf. Baldwin, *Social and Eth. Interpret.*, Index, 'Publicity,' 'Private.' (J.M.B., F.H.G.)

Public Law [Lat. *publicum ius*]: Ger. *Staatsrecht*; Fr. *droit public*; Ital. *diritto pubblico*. That part of law which looks mainly to public interests and relations.

In the pursuit of the remedies which it affords, the state is generally the actor. It comprehends the heads of Constitutional

law, Administrative (including Revenue) law, Criminal law, and Criminal procedure. Holland would also (*Jurisprudence*, xvi. 314) include the law and procedure applicable to the state, considered in its quasi-private personality, e.g. as an owner of property not employed for any public use. International law, so far as it is accepted in any state, is part of its municipal law, and is most properly assigned to its public law; though many jurists oppose this view on the ground that the state can owe no legal duty to another state, which can be the proper subject of a legal rule. See Pollock, *Jurisprudence*, iv. 96. Ecclesiastical law, where there is an established Church, is also a part of public law. See Markby, *Elements of Law*, § 305; and Bluntschli, *Dict. du droit public*. Cf. PRIVATE LAW. (S.E.B.)

Publicity: see PUBLIC AND PRIVATE.

Pull Sensation: Ger. *Zugempfindung* (K.G.); Fr. *sensation de traction*; Ital. *sensazione di stiramento*. The sensation obtained when the skin is pulled upwards from the muscle; the reverse stimulus to that of PRESSURE SENSATION (q.v.). The term is recommended.

Run a string through a piece of court-plaster (or a postage stamp), and, the end being held by a knot under the plaster when the latter is stuck upon the skin, pull on the string. The sensation may be secured also by pulling upon a hair, though it is then difficult to isolate it as a distinct quality. The term 'traction' is sometimes used for pull; cf. Sanford, *Course in Exp. Psychol.*, 30.

Literature: HALL and MOTORA, Amer. J. Psychol. i. (1887) 93; BLOCH, Arch. de Physiol., 5e sér., iii. (1891) 322. (J.M.B.)

Pulse [Lat. *pulsus*, a beating]: Ger. *Puls, Pulsschläge*; Fr. *pouls*; Ital. *polso*. Rhythmical wave of tension through the arteries, arising from contraction of the heart.

In cases of great vascular dilatation the pulse may be transmitted through the capillaries to certain veins, or it may be present in the larger veins. See VASO-MOTOR SYSTEM. (C.F.H.)

Apparatus for recording the pulse beat, both as to rapidity and as to force, are in use. (J.M.B.)

Punishment [Lat. *punire*, to punish]: Ger. *Strafe, Bestrafung*; Fr. *châtiment, punition, peine*; Ital. *punizione, pena*. (1) The infliction of pain or other penalty upon a person for the violation of a regulation or command.

(2) In law: the infliction of pain or other penalty upon a person for the violation of the laws or customs of a community of which he is a member. Cf. SANCTION.

Punishment takes various forms. It may consist in a mere rebuke or admonition. It may consist in a deferred sentence, which does not come into effect if the offender desists from committing further offences for a certain definite period. It may consist in taking securities for an offender's good behaviour in the future, from himself or from his friends. Sometimes punishment takes an economic form, in the shape of a fine or in the confiscation of his property. Sometimes it takes the form of depriving the offender of his liberty by committing him to a prison or to a reformatory institution. Sometimes the offender is subjected to corporal punishment, such as mutilation, flogging, and putting to death. The nature of the punishment inflicted on an offender depends to a great extent on the stage of civilization which the community in which he lives has reached. Among uncivilized and partially civilized races corporal punishment in all its forms is the most common method of dealing with offenders. As civilization advances, corporal punishment is supplemented and modified by economic punishments, such as fining and confiscation. In modern civilized communities corporal punishment is relegated to a very subordinate position in the penal code. Such punishments as branding and mutilation have altogether disappeared, and in some continental codes flogging and capital punishment have disappeared as well. The most common forms of punishment among civilized societies at the present day are admonition, securities for good behaviour, the deferred sentence, fining, and imprisonment. Corporal punishment, whether it takes the form of whipping, flogging, or the penalty of death, is only resorted to in a small number of cases; and although attempts are made from time to time to extend it, these attempts are as a whole unsuccessful.

Penal codes are the growth of centuries, and are not based upon theories of punishment; yet the stamp of various theories may be found upon them. Nevertheless, it is correct to say that they are on the whole dominated by the retributive theory of punishment. According to this theory the supreme object of punishment is to impose a penalty on the offender which will correspond as nearly as possible to the character of the offence. If the offence is serious, the penalty will be correspondingly severe; if the offence is trivial, the punish-

ment will be correspondingly light. According to this theory the principal end of criminal justice is to secure the person of the offender, to try him in accordance with the recognized rules of evidence for a certain specific offence, and, if convicted, to sentence him to the penalty attached by code or custom to such an offence. In countries where the penal law is codified, the code usually lays down a maximum and a minimum, which the judge is bound to observe. In countries such as England, where the penal law has not been codified, the judge has a wider discretion, but as a matter of fact his sentences are largely dominated by the customs of the bench, which almost supply the place of positive law.

The retributive theory of punishment, as it is embodied in penal codes and customs, has been considerably modified in its operation since the end of the 18th century. The philosophy of the 18th century was superficial in many respects, but it gave birth to the great humanitarian movement, which has, under various names, continued to gather in volume and strength. Under the influence of this movement the ferocious punishments inflicted on offenders in the name of retributive justice were largely mitigated. It was pointed out that the wholesale flogging, mutilating, and gibbeting which went on in the name of law were in most cases altogether out of proportion to the offences committed. These punishments were not acts of retribution, but acts of atrocious barbarity perpetrated in the name of justice. According to the dominant ideas of the 18th century, man is a free and rational creature; crime is an error of the will, and the offender must be dealt with by a kind of punishment adapted to the rational nature of man. Corporal punishment according to this view was suitable for brutes and not for men. The unspeakable squalor of prison life as it existed in the 18th century was an offence against the dignity of human life. The herding of all ages and both sexes in grim and gloomy establishments reeking with moral and material pollution came to be regarded as a degradation which no human being should be called upon to undergo. If a man had sinned against the laws of his country, it was considered as sufficient retribution to deprive him of his liberty, and when under detention to appeal to him as a rational creature and show him the error of his ways.

The results of the humanitarian movement on penal law have been beneficent in a variety of directions. Punishment as a whole has been immensely diminished. Reformatory institutions have to a large extent taken the place of prisons for the young. In prisons the sexes have been separated; industry has been systematically introduced; the health of the prisoner has been better attended to; moral and spiritual influences have been brought to bear upon him when under detention; incitements to good conduct and industry have been devised, and in many countries the tendency of the judges has been to shorten the duration of detention. In cases of comparatively slight offences, imprisonment has been less and less resorted to, and such penalties as admonition, sureties, fining, and probation of first offenders have taken its place.

While the humanitarian movement has done much to mitigate the severities of the retributive principle, it has one defect in common with this theory. Both look at the offence rather than the offender, at the crime rather than the criminal. It is assumed that all offenders are alike, that all of them have the same mental constitution, that the acts of all of them are determined by the same conditions. If this assumption were correct, there would be some reason for measuring punishment by the nature of the offence. But when we look at the facts, we find that it is not correct to assume that all offenders are constituted alike or are subjected to the same external conditions. If we go through the corridors of a penal establishment and make a personal examination of the prison population, we shall find the widest divergences in the mental and physical characteristics of the inmates as well as in the external circumstances of their lives. We shall find a considerable percentage of them inferior to the average population in bodily or mental constitution, or perhaps in both. We shall find a high percentage who have been born and bred in the most miserable social and material circumstances. We shall find the young and the old, the vigorous and the enfeebled, the girl and the boy, the man and the woman, all shut up in the same establishment, and all subjected to almost exactly the same kind of punishment. This method of punishment would be unobjectionable if the theory of retribution is correct, for, according to this theory, you are to punish the offender in a way which will correspond with the gravity of the offence. It would also be unobjectionable if it were true that all offenders are alike, for in such a case, where two people have com-

mitted the same offence, it is only fair that they should receive the same amount of punishment. But a vast accumulation of facts go to show that the internal and external conditions of offenders differ enormously, and that the principle of similarity of punishment is inequitable and ineffective when applied to them. A proof of its inefficiency is to be found in the fact that in most civilized communities the number of offenders against the criminal law is increasing faster than the growth of population, and in the further fact that in a large percentage of cases the punishment inflicted has no effect in preventing the liberated offender from continuing a career of crime.

These facts have led to the rise of new theories of penal law and punishment. These new theories are based upon new views as to the conditions which produce the criminal population. It is the contention of Lombroso and his followers that the offender is abnormally constituted both in body and mind, and that his offence is merely the inevitable outcome of his abnormal constitution. These constitutional defects are partly atavistic and partly pathological; they consist in certain physical and mental peculiarities which can easily be discerned by a careful examination of the individual offender. Where the peculiarities are few in number or are not deeply seated, you have the 'occasional criminal,' who has no deep-rooted disposition to crime. His moral sense is weak, and he easily falls a victim to the stress of adverse external influences. Then, again, you have the 'criminal of passion'—persons of an irritable, jealous, revengeful temperament. These offenders are not deficient in moral sense, but they are at times swept off their feet by gusts of passionate impulse which hurry them into crime. In addition to these, there is a class of criminals who are either insane or are on the borderline between sanity and insanity—men of unstable equilibrium, suffering from nervous weakness or exhaustion. Some authorities consider that this class constitutes 10 per cent. of the prison population. Another class are the 'habitual criminals.' This is a large class, and is made up of vagrants, petty thieves, and professional criminals. They are chiefly offenders against property, and are partly the product of adverse social circumstances and partly of inherited mental defects. Finally, there is the class of 'born criminals.' Mentally, this class is without moral sense, brutal, precocious, thoughtless, and on a level with the savage in general mental characteristics. They also resemble the savage in physical appearance—with a retreating forehead, projecting ears, a heavy lower jaw, a badly shaped skull and face, and other characteristics which point to atavism. These born criminals are considered to be practically incorrigible. The school of writers who classify offenders in the manner which has just been mentioned are called criminal anthropologists (cf. CRIMINAL). They take this name because they look upon crime as the outcome of the anthropological condition of the offender, that is to say, of his mental and physical constitution. Punishment they do not regard as an act of retribution, but as a means of social protection. The end of punishment is not retributive, but utilitarian—namely, the protection of society. This end is most effectually achieved by adapting the punishment as far as possible to the characteristics of the offender. Its general method is to exclude the offender from social life until he is presumed to be fit to re-enter it; and if he is never fit, as is supposed to be the case with the born criminal, he is permanently excluded from social life. In fact, the outcome of the teachings of the criminal anthropologists, in so far as imprisonment is concerned, is the indeterminate sentence. The offender is kept in detention till it is believed that he has ceased to be a danger to society.

It will be observed that the anthropological school attribute criminal conduct in the main to the individual conditions of the offender.

Another school of writers has arisen in recent years in France and Germany who maintain, in opposition to the anthropological school, that it is not so much the individual conditions as the social conditions of the offender which are the chief causes of crime. This school is known as the school of criminal sociology. Offences against the criminal law, according to the criminal sociologist, are a product of the wretched social circumstances, and more particularly of the wretched economic circumstances, of the delinquent. The existence of the born criminal is questioned; criminals are divided into two great classes—'occasional' and 'habitual' criminals.

The truth seems to lie between the two views. The criminal is partly a product of adverse individual conditions and partly a product of adverse social conditions, and as a rule a product of both sets of adverse circumstances acting in combination. The sociological school is in agreement with the anthropological as to the principles of punishment.

It considers that the supreme object of punishment is social protection, and maintains that punishment should be individualized and adapted to deal with the conditions which have produced the offence. It considers repression to be necessary, but it regards repression as of comparatively little value as a means of diminishing crime. Repression does not touch the conditions from which crime arises; in most cases it aggravates these conditions. Its value is therefore exceedingly small. According to the criminal sociologist, it is to an enlightened system of social politics, and not to schemes of punishment, that we must look for a diminution of crime. If crime is a product of the social and economic conditions of the community, the way to reduce it is to better these social and economic conditions. Punishment does not touch these conditions; it does not touch the sources of crime, and it is this fact which makes it of so little utility as a deterrent to the offender or as a permanent protection to society. (W.D.M.)

From the psychological point of view certain principles seem to be involved which lie at the root of the various theories of punishment. (1) The retributive theory is based upon the early sense of JUSTICE (q. v.), into which the motive of revenge enters, carrying with it the notion of guilt. Punishment is then a substitute for private vengeance; and as it is doubtful whether justice, as social recognition of equality of rights and obligations, could have arisen without this rude motive of revenge, so is it doubtful whether socially regulated punishment could have been constituted without the rude recognition of guilt which is correlated with vengeance. (2) The basis of the reformation theory of punishment is to be sought, no doubt in part, in the disciplinary value of pain in personal and social training. Pain is nature's penalty for the violation of law. Even in the training of animals punishments are involved, though to a less degree than are rewards. With children the discipline of pain holds its place, even before the excessive emphasis now often laid upon the 'softer way of love.'

In the consciousness of the child both these reasons for punishment seem to be normal and to be justified during his social growth. He responds to pain, and the restraint of fear is vital and effective. At the same time, we find him insisting upon the rude form of justice mediated by revenge and based upon guilt. He demands that his wayward playfellow be punished for his deeds.

Objectively considered, the adjustment of punishments is a function of social welfare. This is seen in certain great outstanding sanctions, such as those attaching to the violation of marriage vows, where the difference in severity of penalty for man and woman seems to be wellnigh universal. Among the ancient Hebrews, says McCurdy (*History, Prophecy, and the Monuments*, iii. 89), 'the infidelity of the husband involved no separation from his wife, while that of the wife or betrothed maiden might be a capital offence according to the decree of the head of the family (Gen. xxxviii. 24).' Much the same is true among the most civilized peoples today; and it is easy to see why it is *socially* necessary that the woman's penalty should be severe, apart altogether from personal and physiological considerations which might in part justify such inequality. For the preservation of the family the first essential is the mother's nursing, care, and training of the children. Desultoriness in the woman's sexual relations destroys home life and domestic training, and social penalties for it must be severe enough to preserve the family. But desultoriness on the part of the man does not have the same effects, and consequently it is socially not so great a crime. In cases in which the distribution of labour in the family is reversed—if such there are—where, that is, the man is the mainstay of family life, the penalties might possibly be reversed so far as this consideration goes. And in a society so developed that the family, with its form of training, is not essential nor of extreme importance, nor so developed that sexual relationships are largely divorced from the production of children (sexual relations having no results)—in either of these cases this ground for the disparity of social penalties would be removed. In countries, indeed, where the illegitimate birth-rate is low, but where sexual licence is at the same time great, as in France (cf. MORAL STATISTICS), equality of man and woman in respect to marital infidelity tends to be established.

Theories of punishment, in short, have to deal not only with what may be called the normative—what ought to be—with retribution, reform, &c., but also with the demands of social utility—what has been and is fit to be—in a society which develops in this or that way (cf. SOCIAL EVOLUTION). We cannot make deductions from fixed ethical principles, nor can our sense of 'humanity'

be our only guide. The case cited shows that social right and wrong have degrees, and that the particular form of convention or law is often determined genetically, on the basis of utility. This particular case, indeed, shows how an ethical principle may have different social applications (here as between man and woman), and how there may be exceptions or tolerations inside of a general formulation. It is often said that law must deal with crime, not with the criminal; must generalize action and attach its penalty to such and such an offence, no matter who commits it; yet from the case cited, we see that such generalizations may in their application be only partial. As a matter of fact the judges and courts recognize this. (J.M.B.)

Literature: JEREMY BENTHAM, An Introd. to the Princ. of Mor. and Legisl.; H. SIDGWICK, The Elements of Politics (1897); C. B. DE BECCARIA, Dei Delitti e delle Pene (1764); LOMBROSO, L'Uomo delinquente; E. FERRI, Sociol. Crim. (1892); GAROFALO, Criminalogia; M. BELTRANI, Scolia sul Governo e sulla Reforma delle Carceri in Italia (1868); G. TARDE, La Philos. pénale (1890); A. PRINS, Criminalité et Répression (1886), Sci. pénale et Droit positif (1899), and Cong. Int. d'Anthropol. Crim., Compte-rendu (1896); KANT, Krit. d. prakt. Vernunft (1788), and Met. Anfangsgründe d. Rechtslehre (1799); HEGEL, Grundlinien d. Philos. des Rechts (1821); HOLTZENDORF, Handb. des Gefängnisswesens (1888); LISZT, Lehrb. des deutschen Strafrechts (1892); JULIUS VARGHA, Die Abschaffung d. Strafknechtschaft (1897); Zeitsch. f. die ges. Strafrechtswiss., Mitteilungen d. int. kriminalistischen Vereinigung; R. FRANK, Das Strafrecht; POST, Grundriss d. ethnolog. Jurisprudenz (1894); C. LETOURNEAU, L'Évolution juridique (1891); R. SALEILLES, L'Individualisation de la Peine (1898); VON IHERING, Der Zweck im Recht (2nd ed., 1899). (W.D.M.)

Punishment (in theology): Ger. *Bestrafung, Strafe*; Fr. *peine, punition*; Ital. *punizione*. Suffering inflicted as a penalty for wrongdoing; it is either disciplinary or retributive in its purpose.

Disciplinary punishment has for its aim the purification and reform of its subject, and is temporary in duration. Retributive punishment is the reward of the ungodly and finally impenitent, and has no definable limit of duration. Cf. RETRIBUTION, and REWARD AND PUNISHMENT.

Literature: EDWARDS, The Salvation of all Men strictly examined; EDWARD BEECHER, The Doctrine of Scriptural Retribution; HUNTINGDON, Conditional Immortality. (A.T.O.)

Pupa [Lat. *pupa*, a doll, girl, fem. of *pupus*]: Ger. *Puppe*; Fr. *pupe*; Ital. *crisalide*. The second or quiescent stage in the metamorphic development of INSECTS (q. v.). See CHRYSALIS.

Literature: PACKARD, Entomology; LUBBOCK, The Origin and Metamorphosis of Insects (1874). (C.S.M.)

Pure (in philosophy) [Lat. *purus*, clean]: Ger. *rein*; Fr. *pur*; Ital. *puro*. Free from all admixture with extraneous, foreign, or irrelevant matter; expressing the intrinsic essence or end, and containing nothing else; containing no reference to application or use, as pure mathematics. As a technical term, it translates Kant's 'rein' as applied to reason, ego, concept, &c., denoting entire absence of any empirical element or factor arising from experience; equivalent to *a priori*.

Spatial determinations, like geometrical extension and figure, for example, belong to the pure form of perception, being distinguished from hardness, colour, &c., which belong to sensation. Kant probably borrowed this use of the term from Wolff (see his *Vern. Ged.*, § 282). He was followed in it by Fichte, Schelling, and Hegel. (J.D.)

In logic: unmixed, unmodified. The expression 'pure reason' goes back as far as Anaxagoras (*Ἀναξαγόρας ἔοικε μὲν ἕτερον λέγειν ψυχήν τε καὶ νοῦν . . . χρῆται δ' ἀμφοῖν ὡς μιᾷ φύσει, πλὴν ἀρχήν γε τὸν νοῦν τίθεται μάλιστα πάντων· "μόνον γοῦν φησὶν αὐτὸν τῶν ὄντων ἁπλοῦν εἶναι καὶ ἀμιγῆ τε καὶ καθαρόν"*—Aristotle, 405 a 13). It is interesting to note Aristotle's understanding of the word here. The expression occurs in the injunctions of the dying Cyrus: *ὅταν ἄκρατος καὶ καθαρὸς ὁ νοῦς ἐκκριθῇ, τότε καὶ φρονιμώτατον εἰκὸς αὐτὸν εἶναι.* *Intellectus purus* is used by St. Augustine. This expression and *cognitio pura* were much used by Cartesians and Leibnitzians to signify freedom from admixture of sense-elements.

Pure act, actus purus, means pure form without matter, or energy without admixture of potency. It is a term of Aquinas and all other Latin peripatetics. The doctrine that God is form, *actus*, *ἐνέργεια*, is in Aristotle, *Met.*, Λ. vii; but the adjective does not occur there.

Pure apperception, a term which Kant explains at length in the third section of the first edition of the *Reduction of the Categories*.

It cannot be understood at all without reading Kant very attentively.

Pure concept: in Kant's doctrine, a concept imposed upon experience by the mind, not derived from it (*Krit. d. reinen Vernunft*, 1. Aufl., 220).

Pure conversion, in logic, is an unusual equivalent of Simple Conversion (q. v.).

Pure intuition: in Kant's doctrine, the pure form of sensuous intuitions, 'which can be known *a priori* before all actual perception.' But it is impossible to suppose that Kant meant here previous in time to all perception. Indeed, it is by no means clear that Kant held that pure intuition, in the state of pure intuition, could come into consciousness at all.

Pure judgment: see *Pure proposition*, below.

Pure knowledge: knowledge of which sensation is not an element.

Pure logic: a phrase often used, but to which no distinct conception can be attached. The following explanation by Hamilton (*Lects. on Logic*, App. I) is as good an explanation as can be given: 'The doctrine which expounds the laws by which our scientific procedure should be governed, in so far as these lie in the forms of thought, or in the conditions of the mind itself, which is the subject in which knowledge inheres—this science may be called *formal*, or *subjective*, or *abstract*, or *pure logic*. The science, again, which expounds the laws by which our scientific procedure should be governed, in so far as these lie in the contents, materials, or objects about which logic is conversant—this science may be called *material*, or *objective*, or *concrete*, or *applied logic*.' Perhaps we may say that *pure* logic is a logic deduced from hypotheses (which some will look upon as axioms) without any inquiry into the observational warrant for those hypotheses.

Pure power, potentia pura, is matter without form, δύναμις without energy or act.

Pure probation, or *proof*, is proof by deduction from hypotheses, or axioms, without any inquiry into the observational warrant for those premises. Such is the usual reasoning of geometry.

Pure proposition, enunciation, or judgment: a proposition *de inesse*, a proposition not affected by modality. The pure proposition, as something merely proposed or contemplated, might be considered as a sort of problematic proposition. But, in fact, it is generally identified with the assertory proposition.

Pure reason: in Kant's doctrine, the faculty of cognizing principles of knowledge quite *a priori* (*Krit. d. reinen Vernunft*, 1. Aufl., 11, also 305, where the matter is explained at length, and the whole transcendental dialectic relates to pure reason).

Pure representation: in Kant, a representation, or immediate object of knowledge, which involves no experiential element (*Krit. d. reinen Vernunft*, 1. Aufl., 20, 50).

Pure syllogism: (1) properly, a syllogism both of whose premises are pure propositions.

(2) Applied by Kant to a syllogism in one of the direct moods, *Barbara, Celarent, Darii, Ferio*. Kant's doctrines of formal logic are very hasty, superficial, and inconsequent.

Pure synthesis: with Kant, the synthesis of a manifold not empirically given (*Krit. d. reinen Vernunft*, 1. Aufl., 77).

Pure taste: taste directed to beauty exclusively, not to other pleasing elements, such as magnificence, lubricity, fun, &c. (C.S.P.)

Pure Experience: a translation of *reine Erfahrung* (cf. Pure). The two principal usages are: (1) Pure experience is a mere succession of sensations, feelings, or images. As this is never experienced in ordinary life, Wundt, for example, calls it 'a conceptual fiction.'

(2) In contrast to such a psychological analysis of experience into its elements Avenarius (*Krit. d. reinen Erfahrung*) denominates the world of the ordinary man the world of 'pure experience.' Reflection on this pure experience of every-day life leads to science and philosophy. (R.H.S.)

Purgatory [Med. Lat. *purgatorius*, a place of cleansing, from *purgare*, to cleanse]: Ger. *Fegefeuer*; Fr. *purgatoire*; Ital. *purgatorio*. A process of purification by suffering in an intermediate state after death, by means of which the departed soul is fitted for a higher state of existence.

Specifically, the state in which, according to Roman Catholic theology, the soul of the penitent who has died in the faith is purged by suffering from venial sins and from the temporal effects of mortal sins already forgiven.

Purgatory, in its general sense, is a feature of the doctrine of transmigration in Eastern and Western thought. As held specifically by the Roman Catholic Church, it is not in any sense an extension of probation, but is purely expiatory in its character. Only penitents are admitted into purgatory. The Romish Church teaches that the inmates of purgatory

may be aided by the Sacrament of the Mass and by the prayers and offerings of the faithful.

Literature: Berington and Kosh, Faith of Catholics (3rd ed., 1846), iii. 140–207; Lownet, Le Purgatoire d'après les Révélations des Saints (1880); Alger, Hist. of the Doctrine of the Future Life; Marshall, Doctrine of Purgatory. (A.T.O.)

Puritanism [Lat. *purus*, pure]: Ger. *Lehre der Puritaner*; Fr. *Puritanisme*; Ital. *Puritanismo*. A name applied to the politico-religious movement which led to the English revolution of 1644 and the establishment of the Commonwealth under Cromwell.

Puritanism originated in the 16th century as a religious movement in opposition to the lax morality of the time and the alleged Romish tendencies of the English episcopacy. It became political also in the 17th century, and was the chief agency in bringing about the overthrow of monarchy and the establishment of the Commonwealth. After the Restoration it ceased to be a political force of importance in England. English Puritanism is deeply indebted to Holland, from whose politico-religious struggle against Spain it derived its most important inspiration. Transplanted to America, Puritanism became the most important single factor in shaping the destinies of the new Commonwealth.

Literature: D. Neal, Hist. of the Puritans (London, 1822); Stowell, Hist. of the Puritans in England (London, 1878); L. Bacon, Genesis of the New England Churches (N. Y., 1874); D. Campbell, The Puritan in Holland, England, and America (N. Y., 1893); E. H. Byington, The Puritan in England and New England (Boston, 1896). (A.T.O.)

Purity (in ethics) [Lat. *puritas*]: Ger. *Reinheit*; Fr. *pureté*; Ital. *purità*. Elevated habit of mind in all ethical relationships, especially in those involving what is sensuous.

The term is often restricted to sexual relationships (cf. Chastity). It is also often pressed into the service of prudery and moral scrupulosity and purism. It is interesting as having been used to illustrate Aristotle's virtue as a mean, and as being the subject of many proverbs—'To the pure all things are pure,' 'Honi soit qui mal y pense,' 'As a man thinketh in his heart, so is he.' (J.M.B.)

Purity (in psychology): Ger. *Reinheit*; Fr. *pureté*; Ital. *purezza*. (1) Of colour: the relative degree of saturation of a colour sensation; the distance of the 'colour' from the black-white axis of the colour pyramid.

(2) Of tone: the degree to which a tonal impression is free from overtones and concomitant noises.

(3) Of musical interval: the degree to which an interval approximates to the ratio of the 'just' as distinct from the 'tempered' scale; or, in general, the degree of accuracy of intonation. See Wundt, *Physiol. Psychol.* (4th ed.), i. 455; Stumpf and Meyer, *Zeitsch. f. Psychol.*, xviii. (1898) 321, for investigations into the sense discrimination of purity of intervals. (E.B.T.)

Purkinje's Images: Ger. *Purkinje'sche Bilder, Sanson'sche Bilder*; Fr. *images de Purkinje*; Ital. *immagini di Purkinje, di Sanson*. The three reflection images observable on the front of the cornea and front and back surfaces of the lens, whose changes of size and relative position demonstrate that the essential factor in accommodation is the changed convexity of the front surface of the lens; also called Sanson's images.

Literature: Purkinje, De exam. phys. organi visus (1823); Sanson, Leçons sur les Maladies des Yeux (1837); Sanford, Course in Exper. Psychol., expt. 108b; Helmholtz, Physiol. Optik, 132; Aubert, Physiol. Optik, 444. (E.B.T.)

Purkinje Phenomenon: Ger. *Purkinje'sches Phänomen*; Fr. *phénomène de Purkinje*; Ital. *fenomeno di Purkinje*. If the ordinary spectrum is darkened, the brightness values of its different parts, as seen by the normal (or by the dichromatic) eye after adaptation, change. The maximal brightness shifts from yellow to green; the long-wave end of the spectrum darkens, and the short-wave end lightens. This phenomenon, the relative brightening of blues in a faint light, was first observed by Purkinje (*Zur Physiol. d. Sinne*, 1825). (E.B.T.)

The change in relative brightness of its different parts persists when the spectrum has become so faint as to be quite colourless; and there is now no doubt that this supplementary vision of twilight (which is acquired only at the end of about twenty minutes) is due to the production in the rods of the so-called visual purple (or rod-pigment), which takes place in a faint light. This view was fully established by Parinaud, and has been since confirmed by various observers. For the argument see Vision. (C.L.F.)

Matters of theoretical importance are: (1) the coincidence of the colourless faint-light spectrum with the spectrum of total colour-blindness (Hering); (2) the non-existence of

the phenomenon in the fovea (v. Kries, *Zeitsch. f. Psychol.*, 1897, xv. 350; v. Kries and Nagel, ibid., 1900, xxiii. 161). (E.B.T.)

The brightening (and whitening) of the *blues* in a state of approaching adaptation (when without doubt the visual *yellow* is the predominant substance in the rods) is what is commonly meant by the term *Purkinje phenomenon*; to distinguish from this the excessive brightening of what was *green*, which occurs after achromatic vision has set in (and when the rod-pigment is in the form of visual *purple*—the right colour for absorbing green light), it is desirable to have a different name; it may perhaps be called *the extended Purkinje phenomenon*.

For the two successive stages of the phenomenon, see an important paper by Tonn in the *Zeitsch. f. Psychol.*, viii. 280. He, however, at that time, followed König's view that blue-vision in general is mediated only by the visual yellow of the rods. (C.L.F.)

Purpose [Lat. *propositus*, from *pro*, before, + *ponere*, to place]: Ger. *Vorsatz*; Fr. *dessein*; Ital. *proposito*. A PROJECT (q. v.) which is adopted for execution but not yet executed.

A purpose is thus an END (q. v.) in the large sense (called 'remote' under that topic, except that its execution is deferred); it differs from intention in being limited to the elements actually present to the mind, i. e. in being a project. As related to plan, it is that for the realization of which the plan is adopted; that is, the plan is the means. See a similar distinction by Höfler (*Psychologie*, 518) between the German terms Plan and Vorsatz. (J.M.B., G.F.S.)

Puzzle Experiment and **Blank Experiment**: Ger. *Vexirversuch*, *Nullversuch*; Fr. *expérience de contrôle*, *attrape*; Ital. *esperimento dubbio*, *esperimento nullo*. In psychological researches, an experiment purposely inserted into a series, though not fulfilling the stated conditions.

Frequently used in the method of right and wrong cases and elsewhere as a control or check upon the regular experiments; for example, in a series where weights of 100 and 105 gr. are compared, some experiments may be given in which two weights of 100 gr. are compared; in testing discrimination of two points on the skin, if the points are to be maintained a fixed distance apart throughout the series, occasionally a single point only may be used. The effect of knowing that a puzzle experiment may occur is to diminish the subject's natural bias in favour of certain of the possible answers; thus, in the first example, this knowledge checks the tendency to prefer the answers 'greater' and 'less' to 'equal'; in the last example there is less liability to judge the two points as two, in doubtful cases. In reaction-time research, a different stimulus from that agreed upon may be given in the course of the series, in order to arouse attention and prevent hasty or mechanical reaction; e. g. a word, in a series of single-letter stimuli.

The results of puzzle experiments are ordinarily not reckoned in the series. Hence the term blank experiment is sometimes used (cf. Külpe, *Outline of Psychol.*, Eng. trans.); the term puzzle experiment is preferred, as the equivalent of Vexirversuch, which is more commonly used by German writers than Nullversuch; objections urged against the term puzzle experiment apply with greater force to blank experiment. The latter term might be applied to experiments which fail to yield results through the fault of apparatus or subject (e. g. anticipation reactions).

Literature: VIERORDT, Zeitsch. f. Biol. (1878), xiv. 303; NORR, ibid. (1879), xv. 297; FECHNER, Revision d. Hauptpunkte d. Psychophysik (1882), 58 f.; HIGIER, Philos. Stud. (1892), vii. 247; KÄMPFE, ibid. (1893), viii. 548 ff.; KÜLPE, Grundriss d. Psychol. (1893), 75 (Eng. trans., 72); TAWNEY, Philos. Stud. (1897), xiii. 163, and many discussions and researches with the method of right and wrong cases (cf. PSYCHOPHYSICAL METHODS). (H.C.W.)

Pyrrho. (cir. 365–cir. 275 B.C.) A Greek, the founder of PYRRHONISM (q. v.), the school of sceptical philosophy.

Pyrrhonism: Ger. *Pyrrhonismus*; Fr. *Pyrrhonisme*; Ital. *Pirronismo*. The doctrine of Pyrrho of Elis, which has been transmitted chiefly by his disciple Timon. More generally, radical SCEPTICISM (q. v.) in general.

Pyrrhonism, like the other post-Aristotelian SCHOOLS OF GREECE (q. v.), was primarily a theory of life rather than of knowledge. Like Stoicism and Epicureanism, it regarded repose of mind, imperturbability, as the goal—as the state of happiness (cf. also the ethical theory of Democritus, under PRE-SOCRATIC PHILOSOPHY, with whom Pyrrho may have been connected through Anaxarchus). This imperturbability or ataraxy of the Wise Man is the result of a suspense of judgment with regard to things, and this suspense in turn is due to the recognition that nothing can be known. This last doctrine was fortified

by arguments drawn in part from the relativism of Protagoras (see PRE-SOCRATIC PHILOSOPHY) and in part perhaps from Megarian dialectic. One perception or impression is *no more* valid (οὐ μᾶλλον) than another, and the same is true of opinions. The arguments or modes of producing this 'suspense' (ἐποχή) were called tropes, of which Aenesidemus formulated ten and Agrippa five. In the Middle Academy (see SCHOOLS OF GREECE) a less radical scepticism prevailed, called PROBABILISM (q.v.), after which the stricter Pyrrhonism was revived, with a less practical and more dialectical aim, by Aenesidemus (probably in the 1st century B.C.) and Agrippa. The chief sources are the writings of the physician Sextus Empiricus (about 200 A.D.), who represents a fourth attitude, *empirical* scepticism. See also SCEPTICISM.

Literature: V. BROCHARD, Les Sceptiques grecs (1877); N. MACCOLL, The Greek Sceptics (1869); ZELLER, Stoics, Epicureans, and Sceptics (1880); M. M. PATRICK, Sextus Empiricus and Greek Scepticism (contains translations of Bk. I of Pyrrhonic Sketches, 1899). (J.H.T.)

Pythagoras. (cir. 582, date of death uncertain.) Was born on the island of Samos, and was very likely instructed by Pherecydes, the Syrian, and Anaximander. He spent many years in distant travels, and in early youth went to Egypt. Moved, when he was about forty years old, to Crotona, Lower Italy, where he founded a secret fraternity which aimed at political mastery, was impelled by mystical and ethical ideas, and was fortified by superior mathematical knowledge. It attained power in Crotona, if not in some other cities of Graecia Magna, but, before the death of Pythagoras at Metapontum, it was overthrown and dispersed. It still continued to exist as a secret philosophical sect and as a sort of mathematical guild, and for at least three centuries preserved a strict organization. See PRE-SOCRATIC PHILOSOPHY (Pythagoreans).

Pythagoreans (from PYTHAGORAS, q.v.): see PRE-SOCRATIC PHILOSOPHY (Pythagoreans).

Q

Quadrivium: see PHILOSOPHY, passim.

Quale: see QUALITY AND QUALE.

Quality (and **Quale**) [Lat. *qualitas*, from *qualis*, of such sort as: a word formed by Cicero (*Acad.*, I. vii. 25) to translate Gr. *ποιότης*, or *τὸ ποιόν*—(C.S.P.)]: Ger. *Qualität*; Fr. *qualité*; Ital. *qualità*. Quality is used: A. Relatively, to denote that a given entity stands in certain relations to some other entity; B. Absolutely, as a class-name for certain kinds of entity (see REAL AND REALITY, III. 'Being').

A. (1) An entity may be said to be a quality of another when it bears to it any one of the relations usually expressed by PREDICATION (q. v.). In this sense it has no fixed correlative, and is contrasted only with 'relation'; all that can be truly asserted of any subject being an assertion either of its own qualities or of its relation to other subjects. Thus 'property,' 'predicate,' 'attribute' are roughly synonymous with it; the main differences being that (*α*) 'property' is also used of relations, not expressed by predication, which may hold of the subject in question; (*β*) 'predicate' has the correlative 'subject'; (*γ*) 'attribute' is usually confined to express relation to subjects which are regarded as substances.

(2) More commonly quality is restricted as follows:

(*a*) The subject of the quality may be merely one of its particulars or instances, i. e. exactly like it; in which case alone we use the expression 'This is *the* quality of that,' e. g. 'The quality of this relation is difference.'

(*b*) In the great majority of cases, quality is correlative to 'thing,' and denotes that of which an instance is part of the thing. In this sense it is contrasted not only with relation, but also with quantity; one thing being said necessarily to differ from another either in quantity, quality, or relations, when by the quantity of a thing is meant either (if extensive) the number of instances of some quality or qualities, or perhaps (if intensive) the 'quantity' of some one instance of a quality. For the special cases of 'figure,' 'size,' and 'position,' see below, B.

(3) Quality appears to be used not only of the relation of a universal to that of which its instance forms a part, but also of the relation of that instance to the whole; e. g. we may say not only that two things have the same quality, but also that each contains a certain quantity of that quality or is composed of certain qualities. In this sense the relation of quality to thing would be that of an existent predicate to its subject.

B. (1) Quality is rarely used as a class-name for all entities which can stand in the relations defined under A (1); but this is the proper use of *quale*. *Qualia* are therefore universals, i. e. entities which must differ in kind from one another; and they are contrasted only with particulars, i. e. instances of universals, or entities which may differ from one another not only in kind, but also merely numerically. Particulars may be either instances of qualities (i. e. 'things,' in the sense in which a thing may be either simple or complex), or relations; but it must not be supposed that, e. g., difference, because it is called a relation, is not therefore a quale: it is a quale, and only particular instances of it, which alone can relate, are not qualia.

(2) Quality is used absolutely in senses corresponding to A (2) and (3), i. e. it is a class-name for particulars of universals or for

the universals themselves, whose particulars serve to distinguish from one another the composite existents usually called 'things.' The things most commonly spoken of are material things, and hence a quality usually means some one of the characteristics by which we distinguish these from one another. Of these characteristics there are two main classes: (*a*) those which occupy space, (*b*) those belonging to the space so occupied. Now it is plain that (*b*) cannot be reckoned as *parts* of material things, if by these be meant, as usual, what occupies space; and yet one of them, 'figure,' has almost universally been reckoned as a quality, and two others, 'size' and 'position,' are sometimes included among *primary* qualities.

The qualities, therefore, which have been divided into the two classes of *primary* and *secondary* have been grouped together, in spite of a difference of relation to material things; for all secondary qualities and one among the primary *occupy* space, whereas the other primary qualities express relations of what occupies space to different qualities of the space which it occupies. Thus 'figure' expresses the relation of a group of instances of one or more qualities to the quality of the volume which they occupy; 'size' or 'extension' is in part an expression of quantity, and would hardly have been reckoned as a quality, were it not that it also expresses the fact that the group of which it is predicated is correlated with a group having a different quality, namely, that which distinguishes spatial position from (e.g.) temporal position; and 'position' expresses relation to a particular part of space, involving quality only in the same sense as 'size.' These three are reckoned among qualities because they are *necessary* to define a causal unit, i. e. the effect a material system will have depends upon its configuration and the distance of its parts, and it must have some position; and they are reckoned among primary qualities because, in conjunction with one single quality occupying space (i. e. material substance), they are *sufficient* to define a complete causal system. Secondary qualities are, therefore, to be defined as those qualities localized in space, which are merely correlated with, and not necessary links in, the causal system of the material universe; and for this reason it is possible to hold the view, first associated with their name by Locke, that they are mere sensations, i. e. that their localization in space is purely erroneous.

History. Inquiry into the nature of quality begins with Plato, who clearly recognized the nature of universals, calling them εἴδη ('ideas'). He may thus be said to define *qualia*, the chief defects in his treatment being: (1) that he is inclined to attribute existence to them, (2) that he does not clearly recognize the nature of the particulars, which are to be contrasted with them. With regard to their relation to 'things,' he does not distinguish the types of predication, and is inclined to treat some relations as qualities of the things related. The terms ποιόν, ποιότης (of which the Latin equivalents *quale*, *qualitas* give us our words) were used by him in a sense roughly corresponding with A (2) and (3), B (2); but they were first elevated into technical terms by Aristotle, who makes ποιόν one of his categories. Aristotle recognizes the distinction of universals from particulars far less clearly than Plato, and hence is more involved in the modern confusion of A (2) with A (3). On the other hand, he makes a step towards the recognition of the difference between primary and secondary qualities, by reckoning position, size, and (possibly) figure as separate categories. This distinction was first clearly emphasized (though not as a doctrine of quality) by the atomistic philosophy of Democritus, adopted by the Epicureans; but the science of dynamics was not sufficiently advanced to demonstrate the unique connection of spatial determinations with material substance, and hence the Aristotelian view that causal relations must be expressed in terms involving secondary qualities was victorious in the ancient world—a view which is often loosely termed a 'qualitative' view of reality, as opposed to the 'quantitative' view of Democritus. This view was prevalent throughout the middle ages, leading, owing to the insufficiency for causal purposes of secondary qualities, to great abuses in the assumption of 'occult qualities.' The firm beginning given to the mathematical sciences at the Renaissance emphasized once for all the importance of the distinction between primary and secondary qualities, and led to the naming of them by Locke. But Locke's view—that the secondary were mere effects in us of things to which the primary really belonged—was, owing to Berkeley's criticism, quickly discredited except among certain materialists; nor has their relation in this respect and distinction from one another ever received an adequate treatment: in philosophy the 'qualitative' view of reality prevails. Quality, as one of

the four 'concepts of the understanding' from which Kant derives his four classes of categories, is equivalent to intensive quantity, 'quantity' standing for extensive; a usage which reflects the common treatment of extensive quantities as groups of particulars, each of which may be called a separate thing, whereas intensive quantities are treated as single predicates; but it has never established that confusion between quantity and quality which it implies. From Hegel proceeds a modern tendency to hold that the categories of quality, quantity, and relation are all self-contradictory, and to obscure the distinctions between them; but at the same time, consciously or unconsciously, a pre-eminence is assigned to quality, since some philosophers avow the view that relations are to be interpreted as qualities of the things related, and most imply that the most ultimate form in which all truths can be expressed is as predicates of several subjects, or, by preference, of one—mistakes which are chiefly due to the neglect of a thorough inquiry into the nature of predication and the consequent failure to perceive that even predicates are only related to their subjects, and that in several different ways. Cf. the following topics, and see LATIN AND SCHOLASTIC TERMINOLOGY (4).

Literature: LOCKE, Essay on the Human Understanding; SIGWART, Logik; BRADLEY, Appearance and Reality. (G.E.M.)

Quality (in grammar and logic). (1) Take a sentence in which a common noun or adjective is predicated of a proper noun, and imagine that there is something in the reality which corresponds to the form of the proposition. Then imagine that this form of fact consists in a relation of the objective subject, or substance, to one being, the same correlate for all cases where the same noun or adjective is predicated in the same sense, and that imaginary being, whether looked upon as real or merely as a convenience of thought, is a *quality*. Thus, if anything is beautiful, white, or incomprehensible, this consists in its possessing the quality of beauty, whiteness, or incomprehensibility.

(2) But in a more proper sense the term quality will not be applied when the adjective, like *incomprehensible*, is conceived as signifying a relation. Thus, whiteness will be, in this narrow sense, a quality only so long as objects are thought as being white independently of anything else; but when this is conceived as a relation to the eye, 'whiteness' is only a quality in a looser sense. Locke defines quality as the power of producing an idea, which agrees with the above explanation tolerably.

Qualitas, having inevitably reached an excessively vague use, was in the Roman schools taken to designate almost any character or characters for which no other name was at hand. Thus arose a variety of special senses. Thus in grammar the difference between nouns which had a plural and those which had not was called a difference of quality; as was the difference between the personal pronouns and *qui, quis*, &c.

(3) In logic: the distinction between the affirmative and the negative PROPOSITION (q.v.) has been called the distinction of quality in propositions by all logicians, without interruption, from Apuleius, in the 2nd century of our era, to our own contemporaries.

Kant, in order to round out a triad, added a third quality, called LIMITATIVE (q.v., 1), that of 'Sortes est non homo,' with a distinction from 'Sortes non est homo.' This will not bear criticism; but Kant's authority and the force of tradition have caused it to survive. As long as the universe of characters is unlimited, it is obvious that any collection of objects have some predicate common and peculiar to them. This being the case, as ordinary syllogistic tacitly assumes it is, the distinction between affirmative and negative propositions is purely relative to the particular predicate. No doubt many logicians have assumed that negative propositions are distinguished from ordinary affirmative propositions in not implying the reality of the subject. But what, then, does 'Some patriarch does not die' mean? Besides, all admit that propositions *per se primo modo* do not imply the existence of the subject, although they be affirmative. At any rate, the resulting syllogistic, if consistent, is very objectionable. If, however, the universe of characters is limited, as it is in ordinary speech, where we say that logical inconsistency and mandarin oranges have nothing in common, then the system of formal logic required will be a simple case of the logic of RELATIVES (q.v.); but the distinction of affirmative and negative propositions will become material or absolute, the forms of simple categorical propositions then being:

Any A possesses every character of the group β.

Any A wants every character of the group β.

Any *A* possesses some character of the group β.

Any *A* wants some character of the group β.

Some *A* possesses every character of the group β, &c.

(4) Quality, even in Aristotle, is especially employed to denote characters which constitute merits or demerits; and this word is remarkable for the number of specialized meanings that it bears. Since Kant it has been employed to designate the distinction of clear and obscure, or distinct and confused, &c. See the preceding topic.

Quality is distinguished as primary, secondary, secundo-primary, essential or substantial, accidental, manifest, occult, primitive, original, elementary, first, derived, real, intentional, imputed, passible, logical, propositional, active, alterant, affective, predicamental, &c. (C.S.P.)

Quality (mental or psychic): Ger. *psychische Qualität*; Fr. *qualité mentale*; Ital. *qualità mentale*. (1) Those attributes of mental contents which do not wholly consist in relations, and have a distinctive character which is not merely constituted by their being more or less than something else.

(2) See SUBSTANCE (4).

The quality of contents of consciousness as such is distinguished from such quantitative attributes as INTENSITY, EXTENSITY, and COMPLEXITY. See those terms. (G.F.S.–J.M.B.)

Quality and **Quantity** (aesthetic). Aesthetic value may be considered under two aspects, quantity and quality, according as it is referred to the magnitude and numerical relations of the aesthetic object or its elements, or, on the other hand, to the intrinsic nature of the object or elements.

Under quantity fall, e.g., limit, rhythm, numerical unity, multiplicity, magnitude (the great, vast, little, pretty), symmetry, proportion, &c.; under quality, the characteristic, significant, charming, unity of kind, contrast, harmony, &c., with various modifications such as the tragic and comic.

The logical terms quantity and quality were applied to the aesthetic judgment by Kant, but in the sense above noted the aesthetic usage was introduced by Herbart and Zimmermann and elaborated by Köstlin.

Literature: ZIMMERMANN, Aesthetik (1865), 36ff.; KÖSTLIN, Aesthetik (1869), 76ff. (J.H.T.)

Quantification of the Predicate: see QUANTITY (in logic).

Quantitative Hedonism: see HEDONISM, and ETHICAL THEORIES.

Quantity [Lat. *quantitas*, amount, from *quantus*, how much]: Ger. *Quantität*; Fr. *quantité*; Ital. *quantità*. (1) The experience and attribute of more or less. (J.M.B.)

(2) Notion of: the thought of the existence of parts within a whole considered in abstraction from the special nature of the parts or of the whole. (G.F.S.)

The fundamental conception of quantity is expressed in the so-called axiom, 'the whole is greater than the part.' In reality, this is a definition; for the whole is a whole just because it is greater than the part, or, in other words, includes the part. It is true, of course, that one whole may be greater than another. But this means the first may be conceived as included within the second; it means that the first might be conceivably substituted for a part of the second. Here it is necessary that the special nature of the whole or its parts should be more or less completely abstracted from. Let one whole be a group of three sheep and the other a group of five. It is obvious that this particular collection of three sheep cannot be contained in that particular collection of five. But if we abstract from the individual identity of the particular sheep, and consider them only in their general character as belonging to the class sheep, the substitution becomes possible. The group of three is smaller than that of five because it could be substituted for a part of the five group, without making any difference to it, considered abstractly not as a collection of just these sheep, but of any sheep whatever. The same holds good for a group of three sheep and another of five cows, if we abstract not only from individual identity, but also from the specific nature of sheep and cows, and consider them merely as animals. The final abstraction is reached, so far as discrete quantity or number is concerned, when we consider the components of a group merely as distinguishable objects of thought. Cf. NUMBER CONCEPT.

The same analysis applies in principle to continuous quantity. A continuous quantum contains parts which by their nature are not separately distinguishable, and therefore cannot be expressed by a number. But this makes no difference to the general concept of quantity. One line in space is greater than another when, on abstracting from difference in position, &c., we see that the second could be substituted for a part of the first without making any difference to it.

The greatest difficulty arises in the case of

intensive quantity (cf. INTENSITY AND INTENSIVE MAGNITUDE). For here we seem to have a difference of more and less without any relation of whole and part. For instance, a sound of a given degree of loudness does appear to be composed of partial loudnesses, and it seems meaningless to speak of a lower degree of loudness as conceivably included within or substituted for part of a higher degree of loudness. We may, indeed, consider intensive quantity as immediate experience, falling under definition (1).

The notion of intensive magnitude may, however, be regarded as implicating parts, though none of them are separately distinguishable within the whole. In this it differs from a continuous extensive quantum. For in a continuous extensive quantum we can distinguish and count an indefinite number of parts. The continuity consists in the fact that however many parts we distinguish, there are still other parts undistinguished. For each assignable part is itself indefinite, divisible into other parts. In the intensive magnitude, on the contrary, there are no assignable parts at all. None the less, it may be maintained that though not separately distinguishable, they may be supposed to exist, and that the supposition is implied in speaking of an intensive quantum at all. The only admissible alternative seems to be the denial that what is called an intensity is a quantum at all—at least, if we consider it by itself, apart from comparison with other similar presentations.

From this point of view it may be held that what is called intensive quantity presupposes the serial arrangement of sensations according to their degrees of resemblance and difference. It is not the separate sensations but the interval between them in the series which is quantitative. Suppose that we are considering, instead of two sounds, two pairs of sounds. Symbolize the one pair by A and B, the other by α and β. We find that we are able to judge whether the difference in loudness between A and B is or is not the same with the difference in loudness between α and β. Thus we can form a series or scale of loudnesses passing from one to another by intervals which we judge to be equal. By counting these equal intervals we can assign a numerical value for the place of any sensation in the series, and this is what is meant by its intensive quantity. This view seems unable to avoid the fallacy of explaining in a circle. For the intrinsic intensity of each sensation it substitutes degrees of resemblance. But what is a degree of resemblance if it is not an intensive quantity?

The psychological development of the cognition of quantity consists in the gradual abstraction from other characters of the object and the fixing of attention merely on the relation of whole and part as such. Every object of consciousness is or implies the unity of a manifold, and has therefore a quantitative aspect. Hence quantity is presented in every objective experience. But it is only by a long process that it comes to be separately contemplated. The abstraction is a mental experiment which justifies itself by its fruitfulness. In fixing attention exclusively on the quantitative aspects of objects the mind finds opened out before it a vast system of numerical and other relations having the character of necessary truths.

The justification of definition (1) is found in the fact of quantitative experience, which is not, however, brought into relation of whole and part with other experiences.

For Kant's doctrine of quantity as belonging to the ANTICIPATIONS OF EXPERIENCE, see that topic. (G.F.S.–J.M.B.)

Quantity (aesthetic): see QUALITY (aesthetic).

Quantity (in logic and mathematics). (1) Any ACCIDENT (q. v.) whereby a substance has part outside of part. Cf. QUANTITY (2).

This is the old definition; and it is true to the old meaning of the word in representing quantity as much more concrete than the modern conception. Quantity (see Aristotle's *Praedicamenta*, vi) is either discrete or continuous. Continuous quantity is either magnitude or time. The old definition of mathematics as the science of quantity is misunderstood, if quantity is here taken in the modern sense; it was only meant that mathematics treated of accidents having number, magnitude, or duration. There was therefore a mathematics of music.

(2) In the general modern sense, quantity is a system of serial relationships.

Serial relationship differs from transitive relationship merely in the point of view, and (so closely connected are the two points of view) in hardly more than the mode of expression. Now, all transitive relation is traceable to inclusion. Hence, quantity might be defined as a system of inclusions looked upon as serial. It is very important to understand that quantity is a mere system of relative ordinal relations in a linear series.

Each complete determination of quantity in a given system is a 'value.'

Quantity is either counted or measured. Counted quantity may have a finite multitude of values. Of systems of quantity of denumeral multitude, the simplest is that of the integer numbers. The system of rational fractions is the only other familiarly used. These fractions can, in several ways, be arranged in their order of quantity by mere counting.

(3) Concepts, or terms, are, in logic, conceived to have *subjective parts*, being the narrower terms into which they are divisible, and *definitive parts*, which are the higher terms of which their definitions or descriptions are composed: these relationships constitute 'quantity.'

This double way of regarding a class-term as a whole of parts is remarked by Aristotle in several places (e.g. *Met.*, Δ. xxv. 1023 b 22). It was familiar to logicians of every age. Thus Scotus Erigena calls logic 'ars illa quae diuidit genera in species et species in genera resoluit.' John of Salisbury refers to the distinction as 'quod fere in omnium ore celebre est, aliud scilicet esse quod appellativa [i.e. adjectives and the like] *significant*, et aliud esse quod *nominant*. Nominantur singularia, sed universalia significantur.' For William of Auvergne, see Prantl, iii. 77. The writer has a long list of similar passages before him. But the Aristotelians had their minds upon the discrimination of different kinds of predication, and insisted that the differences of different genera are different, thus forbidding cross-divisions. Arnauld, however, in *l'Art de penser*, conceives all predicates, or all essential predicates, as alike, without distinguishing *genus* and *differentia*; and was so led to devote a short chapter (vi) to *l'étendue* and *la compréhension* before taking up the predicables. But his services in the matter have been grossly exaggerated, and it really seems to have been Kant who made these ideas pervade logic and who first expressly called them quantities. But the idea was old. Archbishop Thomson, W. D. Wilson, and C. S. Peirce endeavour to make out a third quantity of terms. The last calls his third quantity 'information,' and defines it as the 'sum of synthetical propositions in which the symbol is subject or predicate,' antecedent or consequent. The word 'symbol' is here employed because this logician regards the quantities as belonging to propositions and to arguments, as well as to terms. A distinction of *extensive* and *comprehensive distinctness* is due to Scotus (*Opus Oxon.*, I. ii. 3): namely, the usual effect upon a term of an increase of information will be either to increase its breadth without diminishing its depth, or to increase its depth without diminishing its breadth. But the effect may be to show that the subjects to which the term was already known to be applicable include the entire breadth of another term which had not been known to be so included. In that case, the first term has gained in *extensive distinctness*. Or the effect may be to teach that the marks already known to be predicable of the term include the entire depth of another term not previously known to be so included, thus increasing the *comprehensive distinctness* of the former term. The passage of thought from a broader to a narrower concept without change of information, and consequently with increase of depth, is called *descent*; the reverse passage, *ascent*. For various purposes, we often imagine our information to be less than it is. When this has the effect of diminishing the breadth of a term without increasing its depth, the change is called *restriction*; just as when, by an increase of real information, a term gains breadth without losing depth, it is said to gain EXTENSION (q.v., in logic). This is, for example, a common effect of *induction*. In such case, the effect is called GENERALIZATION (q.v.). A decrease of supposed information may have the effect of diminishing the depth of a term without increasing its information. This is often called *abstraction*; but it is far better to call it *prescission*; for the word *abstraction* is wanted as the designation of an even far more important procedure, whereby a transitive element of thought is made substantive, as in the grammatical change of an adjective into an abstract noun. This may be called the principal engine of mathematical thought. When an increase of real information has the effect of increasing the depth of a term without diminishing the breadth, the proper word for the process is *amplification*. In ordinary language, we are inaccurately said to *specify*, instead of to *amplify*, when we add to information in this way. The logical operation of forming a hypothesis often has this effect, which may, in such case, be called *supposition*. Almost any increase of depth may be called *determination*.

(4) Syllogistic is sometimes regarded as the mathematics of a system of quantities consisting of but two values, *truth* and *falsity*.

(5) The quantity of a proposition is that respect in which a universal proposition is regarded as asserting more than the corresponding particular proposition: the recognized quantities are UNIVERSAL, PARTICULAR, SINGULAR (see those terms, in logic), and—opposed to these as 'definite'—Indefinite. *Quantitas* is used in this sense by Apuleius.

Quantification of the Predicate. The attachment of signs of propositional quantity to the predicates of simple propositions is called by this name. The *dictum de omni* defines the relation of subject and predicate, so that 'Any *A* is *B*' is to be understood as meaning 'To whatever *A* is applicable, *B* is applicable.' But this definition must be modified, in order to give any room for a quantification of the predicate. If then we are to take *all* and *some* in their proper distributive senses and not in collective senses, to say that 'Every man is every animal' would, as Aristotle remarks, be absurd, unless it were meant that there was but one man and one animal, and that that one man was identical with that one animal. This system has never been proposed. But Hamilton, with his followers, T. S. Baynes and Calderwood, take the marks of quantity in a collective sense. They thus have, as one of the propositional forms, 'Some man is not some animal,' which precisely denies 'Every man is every animal,' in the distributive sense, and is entitled to an equal standing in logic. It does not deny 'All man is all animal,' in the collective sense of these logicians. This system had some vogue in its day.

De Morgan's system of Propositions. This permits the retention of the *dictum de omni*, merely applying propositional quality to the subject. We thus get the following eight forms of proposition:

)) To whatever *A* is applicable, *B* is applicable.

(·) To whatever *A* is inapplicable, *B* is applicable.

)·(To whatever *A* is applicable, *B* is inapplicable.

((To whatever *A* is inapplicable, *B* is inapplicable; i.e. To whatever *B* is applicable, *A* is applicable.

() To something to which *A* is applicable, *B* is applicable.

(·(To something to which *A* is applicable, *B* is inapplicable.

)·) To something to which *A* is inapplicable, *B* is applicable; i.e. To something to which *B* is applicable, *A* is inapplicable.

)(To something to which *A* is inapplicable, *B* is inapplicable.

The above is substantially one of De Morgan's own forms of statement, called by him onymatic. There is no objection to this system; but it is an idle complication of forms which does not enable us to take account of any mode of inference that the old system does not cover. Still it does away with the figures of syllogism. But whatever the merits or demerits of the system, De Morgan developed it with logical elegance. (C.S.P.)

Quantity (in physics). A magnitude which admits of precise comparison or measurement. Usually limited to concepts expressed by algebraic symbols. Cf. the other topics QUANTITY, also VALUE (in mathematics). (S.N.)

Quantum [Lat.]. Determinate QUANTITY (q. v.).

Quicunque. A designation of the ATHANASIAN CREED (q. v.) from its introductory words *Quicunque vult*, Whosoever will. (A.T.O.)

Quiddity (**Quid, Quod, Quo, Quem,** in phrases) [Lat. *quidditas, quid*, what]: Ger. *Quiddität*; Fr. *quiddité*; Ital. *quidditâ*. See LATIN AND SCHOLASTIC TERMINOLOGY (4, 5).

Quietism [Lat. *quies*, rest]: Ger. *Quietismus*; Fr. *quiétisme*; Ital. *quietismo*. A form of MYSTICISM (q. v.) which lays emphasis upon the passive and receptive attitude of the human spirit in relation to the influx of the divine Spirit, and making little or nothing of activity in religious matters, whether ceremonial or moral activity, and everything of contemplation.

It made the Sabbath a symbol of rest in God. Its aim was the absorption of the practical personality in God. Its chief representatives are Angelus Silesius and Molinox. The influence of the latter, a Spanish priest, was considerable in the Roman Catholic Church. Cf. PATRISTIC PHILOSOPHY, ad fin., also ST. THOMAS (philosophy of). Fénelon represented it until it was condemned by the pope under the influence of Bossuet. Madame Guyon is its chief literary representative. It is somewhat akin to PIETISM (q. v.) and to the religious philosophy of the Friends. (J.D.)

Quinque voces: see PREDICABLE.

R

Rabbinism [Heb. *Rabbi*, from *rab*, much]: Ger. *Rabbinismus*; Fr. *rabbinisme*; Ital. *rabbinismo*. A doctrinal system which arose among the Jews after their return from the Babylonian captivity, the essential feature of which was the claim that oral tradition is necessary to supplement the law of Moses and is of equal authority with it.

Rabbinism arose out of the necessity of adapting the written law to the conditions of the life of the people. It gave rise to a body of traditional interpretations and regulations embodied in the Mishna, the Talmud, and later, the Cabala. The Rabbinical movement is divisible into two great periods: (1) that of development, during which the principal Rabbinical books were produced. This period ended with the 5th century A.D. (2) That of application and further interpretation, embracing the subsequent period during which the creation of new traditional matter had practically ceased.

Literature: McCaul, Sketches of Judaism and the Jews (London, 1838); Concise Dict. of Religious Knowledge, art. Jews; McClintock and Strong's Cyc. of Bibl. Knowledge, art. Rabbinism; Jost, Gesch. d. Judenthums u. seiner Sekten (1857–9). (A.T.O.)

Rabies [Lat. *rabies*, rage]: Ger. *Hundswuth*; Fr. *rage*; Ital. *rabbia*. The disease following the introduction of a specific poison, most usually occasioned by the bite of a rabid dog; and which from one of its symptoms in man—namely, the paroxysm caused by the attempt to swallow, and the consequent dread of water—is also termed hydrophobia.

The period of incubation intervening between the introduction of the poison and the appearance of the symptoms is stated to be on the average from six weeks to three months. Death often ensues within two or three days after the onset of the marked symptoms. The mental symptoms are definite, beginning as a rule with an ill-defined dread or suspicion that something is wrong, and followed by hallucinations, mainly of sight and hearing. The stage of hallucination is followed by that of excitation or mania, which is slight in some cases, and in others leads to destructiveness, delirium, &c. If the patient survives the stage of excitation there ensues the stage of exhaustion, marked by paralysis, usually proceeding from the lower nerve-centres upward. It is during the stage of excitation that the hydrophobic and spasmodic symptoms appear.

There is also noted a pseudo or hysterical hydrophobia, which imitates the usual symptoms but differs from them in some details. The history of the bite may be uncertain; the patient is apt to talk constantly about the dog and the bite; the true respiratory spasm does not appear; the excited condition may last days or even weeks, and so on.

One of the most interesting characteristics of rabies is that the mental symptoms offer a close parallelism in man and in the higher animals. A dog stricken with rabies exhibits all evidences of the periods of hallucination, excitation, and paralysis. (J.J.)

Race [MHG. *reiz*, line, scratch; Lat. *radix*, root]: Ger. *Rasse*; Fr. *race*; Ital. *razza*. (1) In biology: family (q. v. under Classification, in biology), e. g. the human race or family Hominidae.

(2) In ethnology: those divisions of the

human family which are, biologically considered, varieties.

For special usages see RACE PSYCHOLOGY. (J.J.–J.M.B.)

In ethnology, race is a general term, and is sometimes contrasted with people or nation. Owing to the migrations and interminglings of all sorts, pure-bred races are very few and difficult to establish. Hence the term race has a relative rather than an absolute value, and refers to a naturally homogeneous, ethnic division of the human family. The most common classification is that of Blumenbach (1781) into Caucasian, Mongolian, Ethiopian, American, and Malay. Cuvier distinguished only Caucasian, Mongol, and Negro. Both of these have been criticized as unsatisfactory by modern ethnologists, who have not, however, agreed upon any uniform classification. Such a distinction as that given by Huxley into Australoid, Negroid, Mongoloid, Xanthocroic, and Melanochroic is more accurate but less easily applied. The further discussion of the nature and differentiation of races at once involves the questions of the selection of differentia, whether colour, anatomical characteristics, language, customs and institutions, habitat, and the like; the question of the original unity of the human race and its centres of dissemination; the question of the origin of the family, and the mode of derivation of kinship; and other questions of similar import which belong to the science of ETHNOLOGY (q. v.).

Other terms similar in connotation to race, but narrower in extent, are clan, tribe, branch, stock, and family.

Literature: see works cited under ETHNOLOGY and ETHNOGRAPHY; KEANE, Ethnology (1896); and Man, Past and Present (1899); RIPLEY, The Races of Europe (1899). An important recent work is EHRENREICH, Anthropol. Stud. ü. d. Urbewohner Brasiliens, Einleitung. (J.J.)

Race Experience: see RACE PSYCHOLOGY.

Race Psychology: Ger. *Rassenpsychologie*; Fr. *psychologie des races*; Ital. *psicologia delle razze, etnopsicologia* (suggested—E.M.). That branch of PSYCHOLOGY (q. v.) which uses as data the manifestations of mind in the various species and races of animals and man.

It is broader than FOLK PSYCHOLOGY (q.v.), which treats of the psychology of human groups only. Race psychology considers the problems of the evolution of mind from its simplest forms—of mental descent analogous to biological DESCENT (q. v.). This usage follows the connotation of 'race experience' used by Spencer for the accumulated experience of successive generations, and has been explicitly adopted by one of the present writers. Cf. EVOLUTION (mental), and COMPARATIVE PSYCHOLOGY.

Literature: SPENCER, Princ. of Psychol.; BALDWIN, Ment. Devel. in the Child and the Race; also citations under EVOLUTION (mental). (G.F.S.–J.M.B.)

Radiance: see ETHER.

Radiation [Lat. *radiatio*]: Ger. *Strahlung, eingeschaltete Neuronen*; Fr. *radiations, couronne rayonnante* (more special—Y.D.); Ital. *radiazione*. The fibres connecting the primary with a secondary sensory centre.

Thus the tracts from the olfactory lobe to the hippocampus, and those from the geniculate body to the cortical visual centre, are radiations. The radiations taken together are called the 'projection system,' the lower centres being projected upon the cortex. Cf. RADIX. (H.H.–J.M.B.)

Radicalism: see LIBERALISM.

Radix [Lat. *radix*, a root]: Ger. *Wurzel*; Fr. *racine*; Ital. *radice*. Bundles of nerve-fibres at the point of emergence from or entrance into the central nervous system. Especially the portion of a peripheral nerve between a spinal or cranial ganglion and the central organ. A nerve-root. Cf. RADIATION.

Several of the nerves of special sense are simply roots, there being no peripheral course distinct from the ganglion. Thus the optic nerve is composed of root-fibres connecting the ganglion in the retina with the primary optic centre. The case of the olfactory nerve is obscure, though probably essentially the same as the optic, except that the homologue of the ganglion is diffuse rather than distinctly localized. (H.H.)

Raison d'être [Fr.]: 'Reason for being.' Used in English in the general sense of justification, utility, 'why and wherefore.' Not a precise term. (J.M.B.)

Ramundus Lullus, or **Raimon Lul** or **Lulli:** cf. LULLY, RAYMUNDUS.

Ramus, Petrus (Pierre de la Ramée). (1515–72.) Studied at the University of Paris. He attacked Aristotle and scholastic philosophers, and was forbidden for a time to teach. Later he received an appointment at the University. Embraced Protestantism, 1561. Died in the massacre of St. Bartholomew.

Range (of stimulation and sensation) [Fr. *ranger*, from *rang*, row]: Ger. *Umfang, Reiz-*

umfang, &c.; Fr. *étendue de l'excitation* (&c.); Ital. *ampiezza* (or *estensione*) *della sensazione* (&c.). (1) Of stimulation: the entire region of those values of stimuli a change in which is accompanied by a change in sensation. It includes the entire series of stimulus values which are effective for the production of sensation from the lower to the upper limen or THRESHOLD (q. v.) values.

(2) Of sensation: the corresponding continuum of sensations. Cf. LIMITS (of stimulation and sensation).

The determination of the range of sensation is much complicated by the relativity of the THRESHOLD, which is remarked upon under that term. (C.L.F., J.M.B.)

Rapport (hypnotic) [Fr.]: the Fr. term is used in English and German; Ital. *rapporto* (*magnetico*). The peculiar relation sustained by a hypnotized person to the hypnotizer during HYPNOSIS (q. v., also for literature).

It is a strong point in favour of the 'suggestion' theory of hypnosis that the 'rapport' may be transferred by suggestion from the hypnotizer to a third person. (J.M.B.)

Ratio [Lat. *ratio*, calculation, relation, reason, doctrine]: Ger. *Verhältniss*; Fr. *rapport*; Ital. *rapporto*. The following relation between quantities: the ratio of A to B is the same as that of C to D when the quotient of A divided by B is equal to the quotient of C divided by D; hence often equivalent to quotient, or fraction. (C.S.P.)

The word is not used in the senses equivalent to the Latin ratio, meaning REASON (q. v.). (J.M.B.)

Ratiocination [Lat. *ratio*, reason]. REASONING (q. v., also for foreign equivalents).

So the Schoolmen. Thus, Aquinas says it is 'quidam motus intellectus transeuntis ab uno in aliud,' which, however inexact in expression, conveys a clear idea. J. S. Mill confines the term to the process of necessary inference, because he is unwilling to admit that this is, properly speaking, reasoning. (C.S.P.)

Rational [Lat. *ratio*, reason]: Ger. *vernünftig*, *rational*; Fr. *rationnel*; Ital. *razionale*. (1) Based on a REASON (q. v., in logic). Thus a conclusion is called rational.

(2) Connected with the exercise, or having the power, of REASONING (q. v.). Thus man is said to be a rational animal. (J.M.B.)

(3) In mathematics: expressible in the form of a fraction, i. e. equal to the exact quotient of the division of one whole number by another. In this sense, the word rational translates the Greek *ῥητός*. (C.S.P.)

Rational and Empirical Ego or **Self**: see SELF.

Rational Number: see RATIONAL (3), and cf. NUMBER.

Rationalism [Lat. *rationalis*, from *ratio*, reason]: Ger. *Rationalismus*; Fr. *rationalisme*; Ital. *razionalismo*. (1) The theory that everything in religion is to be rationally explained or else rejected. The application of ordinary logical standards and methods to dogma. Opposed particularly to supernaturalism. As Lecky (*Hist. of Rationalism*, i. 16) says, it signifies not 'any class of definite doctrines . . . but rather a certain cast of thought or bias of reasoning . . . which leads man on all occasions to subordinate dogmatic theology to the dictates of reason and of conscience.' In this sense it finds its best expression in the ENLIGHTENMENT (q. v.) of the 18th century.

(2) The theory that reason is an independent source of knowledge, distinct from sense-perception and having a higher authority. Opposed to SENSATIONALISM (q. v.). See REASON; and cf. INTELLECTUALISM, INTUITION, NOUS, and UNDERSTANDING.

(3) The theory that, in philosophy, certain elementary concepts are to be sought, and that all the remaining content of philosophy is to be derived, in a deductive way, from these fundamental notions. Opposed to EMPIRICISM (q. v.). In this sense it is used particularly of the method first explicitly stated by Descartes, developed by Spinoza and Leibnitz, formulated in detail by Wolff, and finally refuted by Kant.

The three senses are historically connected. The 18th century rationalism in morals and theology is derived from the insistence by Descartes upon method, and upon clearness and distinctness as criteria of truth. It is combined, however, with an empiricism which descends from Locke. The use of rational conceptions as the source from which other ideas are to be deductively derived is, of course, impossible unless there is some faculty through which these ideas are made known, as innate or *a priori* ideas, or through intuition, and so the second and third senses run together. None the less, rationalism in the second sense applies to a particular part of the *content* of philosophic doctrine, while in the third it expresses the *method* taken to be final in philosophy. The sketch that follows is confined to the third sense.

Descartes, seeking a criterion of certainty, hit upon the undoubted existence of inner

experience, and of certain ideas there found, which are *clear*, i.e. intuitively present and manifest, and *distinct*, precisely determined in themselves and in relation to other ideas. From these, by a mathematical method, various other truths may be derived; and with the system of such truths, original and derived, certain truth or science ends. The Port Royal *Logic* and the logical treatises of Geulincx attempted to expound the method with greater explicitness; but Spinoza completes it, first, by arranging the Cartesian philosophy, *de more geometrico*, and then by presenting his own philosophy in the *Ethica* as a series of axioms, definitions, propositions, &c. Leibnitz took up the idea with his usual energy and systematizing power, and advanced the idea of a universal logic and language which should be to philosophy what his calculus was to physics. He analyses all the conceptions involved more definitely; brings out the *a priori* character, the necessity and universality of all the primary notions; sets up as their criterion the principle of contradiction or impossibility of the opposite; and carries further the criterion of distinctness, making it to be that which is distinguished in itself from all other notions, and of 'adequate' —that which is clear down to its last constituent element and their relations to one another. Wolff systematized these conceptions of Leibnitz and combined them with an academic exposition of all the branches of philosophy.

Kant, awakened from his 'dogmatic slumber' in the rationalistic school by his acquaintance with Hume's sceptical attack upon causality and the principle of necessary connection, finally turns against rationalism as a method. He shows (*a*) that its identification with mathematical method is false, since the latter proceeds not by *analysis* of concepts, but by *construction* of space and time elements; (*b*) that from concepts only that can be deduced which has been previously put in them, and that hence the method is tautological or 'analytic' merely; (*c*) that to be a source of new truth, or synthetic, rational concepts must be applied to material of sense, gained in experience; (*d*) that when they are used as if they were themselves synthetic, certain fundamental antinomies, or mutually self-contradictory propositions, arise. Kant still endeavours to combine the truth of rationalism with that of empiricism; these necessary concepts *exist* independently of experience, but are *valid* only when used in reference to experience. Although the rationalistic method is still incidentally used (even by those who claim to belong to the school of 'experience,' as by Spencer in his UNIVERSAL POSTULATE, q.v.), Kant gave it its death-blow as *the* method of philosophy. Hegel revived rationalism in a transformed sense, not applying to one factor or phase of knowledge, opposed to experience, but the construction of experience itself as a system of reason. (J.D.)

Rationalism (in aesthetics). A term applied to theories or tendencies in aesthetics which seek to explain aesthetic value by principles of an essentially logical nature, i.e. principles which relate properly to the work of the reason, such as unity, perfection (in the sense of conformity to an objective end), correctness, &c.

It is abstract FORMALISM (q.v.), and is opposed to SENSUALISM (q.v.). It differs from INTELLECTUALISM (q.v.) in that it relates rather to processes than to content. See also PERFECTION.

Literature: MARSHALL, Pain, Pleasure, and Aesthetics (1894), 120 ff.; HARTMANN, Aesthetik, I. Th. 1, B. I. iii. 1 (1894). (J.H.T.)

Rationalism (in theology). (1) The doctrine which teaches, in opposition to mysticism, that the organ of religious knowledge is ratiocination rather than intuition.

(2) The claim that human reason is competent to discover and define religious truth without supernatural aid or divine revelation. Cf. RATIONALISM (1).

Rationalism *versus* mysticism has constituted an issue in all religious thought. Rationalism *versus* supernaturalism not only denies the supernatural in general, but specially the supernatural origin of Christianity and the claim of the Scriptures to be a divine revelation. It repudiates external authority and tends to combine a theory of naturalistic development with the claim that all religious truth is discernible by the unaided powers of reason.

Literature: LECKY, Hist. of Rationalism (London, 1865); CAIRNS, Unbelief in the Eighteenth Century (1881); STÜNDLIN, Gesch. d. Rationalismus u. Supernaturalismus (1826); AMAND SAINTES, Histoire crit. du Rationalisme en Allemagne (1841); THOLUCK, Gesch. des Rationalismus (1865). (A.T.O.)

Ravaisson (-Mollien), Jean Gaspard Félix. (1813–1900.) Born at Namur, and studied at the Collége Rollin and under Schelling at Munich. He became professor of philosophy at Rennes in 1838, and later held for many years the government position of

inspector of higher education. He belonged to the French idealistic school.

Ray of Direction: Ger. *Richtungsstrahl*; Fr. *rayon de direction*; Ital. *raggio di direzione*. The parts of the LINE OF DIRECTION (q. v.) that lie before the cornea and behind the lens, forming a portion of the path of what Helmholtz calls the 'ray of direction.'

The course of the ray and line may vary within the space bounded by the front surface of the cornea and the back surface of the lens. See LINE OF SIGHT.

Literature: HELMHOLTZ, Physiol. Optik (2nd ed.), 91. (C.L.F.)

Raymond of Sabunde. Died 1432. Born in Barcelona, Spain. He lived as philosopher, physician, and professor of theology in Toulouse, where he died.

Reacter: see REAGENT (2), and SUBJECT (of experiment). Not recommended. (J.M.B.)

Reaction [Lat. *reactio, re + actio*, action]: Ger. *Reaktion*; Fr. *réaction*; Ital. *reazione*. Response of a regular sort to stimulation.

Applied equally to low organisms which give reactions to light, &c., and to the highest; as vaso-motor reactions, reflex reactions, &c. The term is also sometimes used of the response of consciousness, notably of the attention. (J.M.B.)

Reaction (in physics): see ACTION AND REACTION.

Reaction Key: see LABORATORY AND APPARATUS, III, C, (1).

Reaction Time: Ger. *Reaktionszeit*; Fr. *temps de réaction*; Ital. *tempo di reazione*. The interval elapsing between stimulation and REACTION (q. v.). (H.C.W.–J.M.B.)

The term may be used to include all responses to stimuli, whether purely reflex or voluntary, and whether simple and definite or more or less complicated. Thus the time of the eye-wink reflex is included, as well as the time elapsing between a spoken word, giving rise to an association train, and some prearranged motor response following the completion of the association.

Reaction time is made up of three elements or periods: (1) the time required to overcome the inertia of the sense organ and transmit the impulse therefrom to the centre; (2) the time occupied by the central process or processes; and (3) the time required to transmit the outgoing impulse from the centre to the motor organ and overcome the inertia of the latter. (1) and (2) constitute the so-called 'physiological' time. The transmission time may be approximately estimated; the rate of propagation of the nerve impulse, measured by electric stimulation of isolated nerve-fibres, is between thirty and forty metres per second. To this must be added the time spent in overcoming the inertia of sensory and motor end-organs, to obtain the entire physiological time. Deducting this from the total reaction time, we get the central time, which some regard as equivalent to the duration of the mental process when the higher centres are involved.

Simple reaction time. Investigations upon reaction time from the psychological standpoint are generally concerned with impulses passing through the higher or cerebral centres. In the simplest case the process is made as automatic as possible. A certain expected stimulus is suddenly 'released,' or brought to bear on the appropriate sense organ, and a prearranged response is made by the reagent as quickly as possible thereafter. The act thus approximates a cerebral reflex. The duration of the entire process, from release of stimulus to execution of movement, is termed the *simple reaction time*. The length of this period differs considerably according to the sense organ affected; for auditory stimuli it is from 120 to 230 σ ($\sigma = .001$ second), for visual from 170 to 290 σ, for pressure about the same as for auditory; the variability of a series taken under constant conditions is about one-tenth of the time. Practice results in a reduction of the time to the neighbourhood of the lower figures mentioned, but considerable difference is found between individuals. Ludwig Lange (*Philos. Stud.*, iv. 479 ff.) found that the time was about 110 σ longer when the attention was directed to the stimulus ('sensory reaction') than when it was directed to the movement of response ('motor or muscular reaction'). Wundt holds that the former includes perception, while the latter is a cerebral reflex (*Physiol. Psychol.*, 4th ed., ii. 309). Baldwin, Flournoy, and others found that the relative length of sensory and motor reactions varies with the individual, the sensory being the shorter in some cases; they hold that these differences indicate habitual attitudes or reaction types, consonant with the mental types of the reagents—what is called, as proposed by Baldwin, the type theory. Cf. TYPE (mental).

The time also varies with the intensity of the stimulus, the degree of attention and fatigue, &c. With stimuli of very small intensity the time is lengthened; the same effect

is observed where several stimuli of different intensity are used, the subject not knowing which to expect; in general, the time varies inversely with the subject's foreknowledge of the conditions. A high degree of attention shortens the time, as when a preliminary signal warns the subject when to expect the stimulus. Mental fatigue lengthens the time; distracting influences have the same effect, e. g. a continuous sound during a visual series. When the attention is strongly exerted, especially in motor reactions, cases of ANTICIPATION (q. v., 2) are liable to occur; i. e. the subject may react before the stimulus is given, either upon some other stimulus, such as the preliminary signal, or by impulse, from sheer inability to inhibit the reaction.

Pressure reactions have been made upon a group of subjects acting in conjunction. The subjects hold hands; the first one presses the hand of the second, the second that of the third, and so on, till the circuit is completed, the first subject noting the time. This is called a chain reaction. The simple reaction time is found by dividing the entire time by the number of subjects, with proper corrections for the beginning and end of the series. Few investigations of reaction times have been made outside of the senses of sight, hearing, and touch.

Complex reaction times. Acts of recognition, discrimination, choice, association, &c., may be included in the reaction, and their duration approximately determined.

(1) Recognition and discrimination. If two or more stimuli differing (e. g.) in intensity are used, the subject to react when he has determined which one is present, the process is called a *discrimination reaction.* If the stimuli are chosen from a large series, each member of which has a well-known name (e. g. the colours, numerals, letters), the subject to react when he has determined what is present, it is called a *recognition reaction.* The discrimination time or recognition time, as the case may be, is found by subtracting the subject's previously determined simple reaction time from the total duration of the reaction; it is about $50\,\sigma$ for the simplest case. The discrimination time for auditory stimuli of different intensities was investigated by Tischer (*Philos. Stud.*, i. 495 ff.); the time lengthens as the number of intensities to be discriminated increases. In vision, many forms of discrimination and recognition have been investigated, such as discrimination of black and white (Wundt), colour recognition (Titchener), letter and word recognition (Cattell), recognition of numerals (Friedrich), &c. (see Wundt, *Physiol. Psychol.*, ii. 368 ff., and references there given). The results indicate that recognition is a shorter process than discrimination; e. g. recognition of colours requires less time than discrimination of two shades in the black-white series. Cattell found that the recognition of familiar objects (represented in pictures) required slightly less time than the recognition of letters of the alphabet or short words, the latter processes being about equal in duration. When the reaction involved naming the given stimulus the order was different: for short words the time was shortest, for letters next, for familiar objects longest (Cattell, *Philos. Stud.*, ii. 635, iii. 452). Using numerals instead of letters, the time increases with the number of figures, especially with more than two or three.

(2) Choice. Choice-reaction involves a different mode of response for each kind of stimulus given. The naming of letters or objects, mentioned above, involves a reflex choice; but in many cases the mode of response as prearranged is purely arbitrary, e. g. reaction with a different finger for each kind of stimulus (Merkel, *Philos. Stud.*, ii. 73 ff.; Münsterberg, *Beitr. z. exper. Psychol.*, i. 69 ff.). The reaction time here is longer than for recognition or discrimination, and increases with the number of kinds of reactions involved. The particular mode of reaction, the individuality of the subject, and the general conditions of the problem introduce such variations, however, that the actual times found probably apply to the specific investigations only. Even with the same subject, the variable factors are so numerous and important that it is difficult to obtain series whose mean variation is small enough to allow the results to pass unchallenged. The same remark applies to complex reactions generally.

(3) Association. The time required for associating an answer with a given question has been investigated. Münsterberg (op. cit., i. 94 ff.) found that a question admitting but a single answer (e. g. 'On what river is Cologne?') was answered more quickly than one which presented several alternatives (e. g. to name a German wine). The actual association time is difficult to determine, however, on account of the uncertainty as to when the purport of the question comes to be understood. Less open to doubt are investigations in which a word or picture is shown, or a word

repeated, with which the subject is to associate an idea, either at random ('free, or unlimited association') or according to prearranged conditions ('limited association'). For limited association may be selected the relation of genus to species, cause to effect, part to whole, or others. Free associations, when obtained, may be classified into logical, objective, and verbal, with their sub-groups, and the relative time of these categories compared (Cattell, *Mind*, xii. 68 ff.; Münsterberg, loc. cit.). Münsterberg finds that the reaction time for free association is, on the average, less than for limited, but greater than for questions admitting of a single answer. The number of subjects thus far tested is scarcely large enough to warrant generalization, especially with regard to the different classes of association.

(4) Other applications. The reaction-time method may be used to determine the character of a mental process. Thus the reaction time of a group of marks or dots varies with the size of the group and the manner of grouping; within certain limits the process is simple perception, as shown by its short duration; where the time is longer the act becomes one of counting (Warren, *Psychol. Rev.*, iv. 569).

The PERSONAL EQUATION (q. v.) observed in astronomical and similar reactions arises from the attempt to react simultaneously with an objective occurrence (such as the contact of a star with a meridian line), where the instant of occurrence can be definitely anticipated on account of the antecedents.

Comparative and abnormal reaction times. The effects of mental and physical fatigue, of the use of drugs, &c., have been measured by comparing the reaction times under these conditions with those of the same individual in the normal state (see PSYCHIC EFFECT OF DRUGS). The reaction times of nervous persons and criminals have been obtained and compared with the average of normal individuals. Differences of sex and race have been investigated, and some attempt has been made to find the reaction times of animals.

Method and apparatus. The length of the reaction time is measured either chronometrically or graphically. In the former method the usual instrument is the Hipp chronoscope, which allows readings to be made to the one-thousandth of a second. For chain reactions a stop-watch gives sufficiently accurate measurements if the number of subjects is large. The graphic measure of time is by means of a chronograph; a record is made on a revolving drum of the vibrations of a tuning-fork during the interval to be measured. See LABORATORY AND APPARATUS, III, C.

The beginning and end of the reaction are usually determined by means of an electric current. The stimulus is arranged so as to make (or break) a circuit which controls the time-measuring instrument, while the reaction movement serves to break (or make) it. The stimulus release is effected in visual reactions by means of a screen with an aperture; the screen swings or falls, revealing the stimulus behind it, and the circuit is made (or broken) simultaneously with the appearance. For auditory stimuli the blow which causes the sound makes the circuit also. The most common form of motor response is the act of pressing a telegrapher's key with the finger or hand. Other forms are with the lip key, tongue key, and mouth or voice key. These are used in complex reactions where a variety of responses is desired; the speaking of different words fulfils this condition. A multiple key for reaction with different fingers is used in choice-reactions. For description of various forms of stimulus releasers and reaction keys see LABORATORY AND APPARATUS, II, C.

Literature: in addition to the references cited above, see WUNDT, Physiol. Psychol. (4th ed., 1893), ii. 305–90, and the many references there given; JASTROW, Time Relations of Mental Phenomena (1890; with full bibliography up to that date); BUCCOLA, Legge del tempo (1883). More recent investigations are: BARTENSTEIN, Zur Kenntnis d. Reaktionszeiten (Diss. Freiburg-i.-Br., 1890); JASTROW, Amer. J. of Psychol., iv. 198, 411; CATTELL, Philos. Stud., viii. 403; REIGART and SANFORD, Amer. J. of Psychol., v. 351; SCRIPTURE and MOORE, Stud. Yale Psychol. Lab., i. 88; SLATTERY, ibid., 71; VAN BIERVLIET, Philos. Stud., x. 160, xi. 125; DOLLEY and CATTELL, Psychol. Rev., i. 159; Proc. Natnl. Acad. of Sci., vii. 393; KRAEPELIN and MERKEL, Philos. Stud., x. 499; WUNDT, ibid., 485; ANGELL and MOORE, Psychol. Rev., iii. 245; ROEMER, Psychol. Arb., i. 566; GILBERT and FRACKER, Univ. of Iowa Stud. in Psychol., i. 62; PATRIZI, Riv. Sperim. di Freniat., xxiii. 257; SCRIPTURE, Stud. Yale Psychol. Lab., iv. 12; COLEGROVE, Amer. J. of Psychol., x. 286; SEASHORE, Univ. of Iowa Stud. in Psychol., ii. 64; SOLOMONS, Psychol. Rev., vi. 376. On the type theory: BALDWIN, Med. Record (N. Y.), Apr. 15,

1893, 455 ff.; FLOURNOY, Arch. d. Sci. Phys. et Nat., xxvii. 575, xxviii. 319, and Observations sur quelques types de réaction simple (Geneva, 1896); HILL and WATANABE, Amer. J. of Psychol., vi. 242; WATANABE, ibid., 408; BALDWIN and SHAW, Psychol. Rev., ii. 259; BALDWIN, Mind, N.S., v. 81; TITCHENER, Mind, N.S., iv. 74, 506, v. 236; FARRAND, CATTELL, BALDWIN, Psychol. Rev., iv. 297. On abnormal and comparative reaction times: FÉRÉ, C. R. Soc. de Biol., 2 févr., 1889, 21 mai, 1892; WALITZKY, Rev. Philos., xxviii. 582; NADLER, Stud. Yale Psychol. Lab., iv. 1; TOULOUSE and VASCHIDE, C. R. Soc. de Biol., 10e sér., iv. 616; BACHE, Psychol. Rev., ii. 475; WEYER, Stud. Yale Psychol. Lab., iii. 96; PIERRE JANET, Des Idées fixes, ii. See also the annual Psychological Index, and BIBLIOG. G, 2, *r*. (H.C.W., J.M.B.)

Reactive Consciousness: see (reflex) ATTENTION.

Reagent [Lat. *re* + *agere*, to act, lead, do]: Ger. *Reagens, Zersetzungs- oder Erkennungsmittel*; Fr. *réactif*; Ital. *reattivo*. (1) In chemistry: any substance used to cause a chemical reaction. Anything used to detect, by means of such reaction, the presence of other substances. Such are Millon's reagent, as test for proteids; Nessler's reagent, used to detect the presence of ammonia; staining reagents.

(2) In psychology: the subject in a psychological experiment. See SUBJECT (of experiment).

(3) In physiology: any stimulus which causes a physiological REACTION (q. v.). (C.F.H.–J.M.B.)

Real and **Reality, Actual, Being, Existence:** for derivations and foreign equivalents see the separate headings below.

I. (1) (*a*) *Real* [Lat. *realis*, from *res*, thing]: Ger. *real*; Fr. *réel*; Ital. *reale*. Universally employed to denote that a thing is both (*a*) an existent (see below, IV) and (*b*) true, though it is also used with various other implications, according to the various definitions of reality adopted or proposed by various philosophers, which are, however, never definitions, but only descriptions of properties supposed to belong necessarily to what is real. Reality is thus properly opposed both (*a*) to things in the conception of which existence is included but which do not truly exist, (*b*) to subjects of non-existential propositions, and (*c*) to what is neither true nor false.

(*b*) Real is very commonly used with a negative implication, as contradictory of the self-contradictory conception, 'that of which it is true both that it does and that it does not exist.' This contradictory conception is very common under various names; and in connection with it things may be said to be more or less real, according to the proportion of truth in the assertions that they do or do not exist. (G.E.M.)

By 'true' above is meant determined (see *Existence*, below, IV), but determined absolutely, that is, in a sphere or universe, existence in which is the final determination of thought (or of that function by which final determination is possible). TRUTH (q. v.) is the limiting notion of determinateness; and for this reason the real cannot be defined, for it is itself the method of determination or definition by which being (see below, III) becomes real; yet its meaning in the genesis of experience can be psychologically traced.

(2) *Reality*: Ger. *Realität*; Fr. *réalité*; Ital. *realità*. Determined being (see below, III), but not being determined as 'what.' For to determine being as 'what' is to circumscribe and relate it in a universe of existence which denies its universality.

Psychologically, reality is a NOTION but not a CONCEPT (see those terms): we *mean* something by reality, but we do not *think* something by it. It is just the fact of determination in experience abstracted from all forms of real determination. It is the mind's recognition of every possible thing as a possible determination or existence; and is thus contrasted with being, which is reality from which determination is in turn abstracted. Reality is that for which all actual coefficients of belief stand in common, apart from the existences for which they respectively stand. (J.M.B.)

II. *Actual* [Lat. *actum*, something done, through Fr.]: Ger. *wirklich*; Fr. *actuel*; Ital. *attuale*. Actual, like real, implies both truth and existence; but, in accordance with its original opposition to 'potential' or 'implicit,' it throws more emphasis on existence, and particularly present and presented existence (cf. FACT). In modern philosophy it is often contrasted with reality, as denoting the degree and kind of reality supposed to belong to the objects of experience. As denoting the degree, it always has a depreciatory sense; things are 'merely,' i. e. relatively, actual. But as denoting the kind, i. e. immediacy or direct presentation, its claim is high. See ACTUALITY. (G.E.M.)

III. BEING (q. v., 1, also for derivation and

equivalents) is a simple term, and therefore strictly undefinable. It denotes 'givenness,' 'presence,' the ultimate 'datum' or 'position.' (J.M.B.)

It is an absolutely universal term; i. e. not only 'realities' and 'actualities,' but propositions, whether true or false, and any terms that can be used in a proposition, have being or are entities. (G.E.M.)

IV. EXISTENCE (q. v. for derivation): Ger. *Dasein*; Fr. *existence*; Ital. *esistenza*. Like being, a simple term and strictly undefinable. It denotes determinate being, or 'givenness,' in a context by which its meaning is largely determined (note the *da* of *Dasein*). So we have universes or spheres of existence, all of which share being. The scholastics used various phrases for these different spheres of existence: *in re, in intellectu, in esse, in posse*, &c. For other meanings see BEING (2, 3). (J.M.B.)

The second sense of reality is fully developed in Plato, who calls 'realities' ὄντως or ἀληθῶς ὄντα, as opposed to the self-contradictory existences, which he calls γιγνόμενα; but his conception of γιγνόμενα does not fully correspond to actuality, though it is applied to the same things, i. e. the objects of experience. Plato does not distinguish being from reality, but 'defines' his ὄντως ὄντα chiefly by the characteristics which belong to mere beings. Aristotle's term for 'reality' in sense (2) is πρώτη οὐσία, which he 'defines' in two ways, either as ἐντελέχεια or ἐνέργεια. Since ἐντελέχεια denotes the combination of form and matter, or ἐνέργεια and δύναμις, and since matter and δύναμις involve incomplete reality, ἐντελέχεια corresponds more nearly to 'actuality'; and since things are more or less real according as they are more or less ἐνεργείᾳ (*actu*, from which our 'actuality' is derived), while the one absolute reality (πρώτως ὄν) has no δύναμις, ἐνέργεια would seem more nearly equivalent to reality: yet πρώτη οὐσία is most frequently defined as ἐντελέχεια. Aristotle regards mere beings as 'logical entities' (λόγῳ χωριστά), thus starting the conception of them as mental or verbal existents, which has been prevalent ever since: the mediaeval controversy between 'Realists' and 'Nominalists' (see REALISM, 1) is in the main a controversy between the Platonic and Aristotelian views on this point. There is no separate Greek term for existence: the use of the term seems to have grown up in the middle ages along with that of essence, this pair gradually taking the place of the less abstract Aristotelian matter and form (ὕλη and εἶδος). The modern contrast between 'actuality' and 'reality' dates only from Kant's emphatic opposition of experience to things in themselves, and is mainly used by philosophers who have been influenced by his doctrines: both before and since his time 'real' in sense (2) is chiefly contrasted with 'ideal' or 'phenomenal.' (G.E.M.)

Real Idealism or **Ideal Realism**: Ger. *Real-Idealismus, Ideal-Realismus*; Fr. *réal-idéalisme, idéal-réalisme*; Ital. *realismo idealistico*. The theory which holds IDEALISM (q. v., 2) in epistemology, i.e. the reduction of the real to elements which are ideal—and with it REALISM (q. v., 2) in metaphysics, i.e. the embodiment of what is ideal in the conception of the real. In short, it is the identification of real and ideal. Cf. IDENTITY PHILOSOPHY.

So, with differences of method and terminology, Leibnitz, Lotze, Fichte, Schelling, &c. See citations in Eisler, *Wörterb. d. philos. Begriffe*, 'Ideal-Realismus.' (J.M.B.)

Realism: Ger. *Realismus*; Fr. *réalisme*; Ital. *realismo*. The term has two important meanings in philosophy, wholly distinct from each other. (1) In one, and the older sense, it is a logical-metaphysical theory, having to do with the reality of universals in themselves, and their relation to individuals. Its classic expression is that universals are real *ante res* (in God's mind), *in rebus* (in nature), and *post res* (in their historical apprehension by human minds). However, it has even more extreme forms.

(2) In the more modern and epistemological-metaphysical theory, it is the doctrine that reality exists apart from its presentation to, or conception by, consciousness; or that if, as matter of fact, it has no separate existence to the divine consciousness, it is not in virtue of anything appertaining to consciousness as such.

It is opposed to IDEALISM (q. v. for history of this meaning). Historically, it has been found in many forms and under many names. See NATURAL REALISM. Kant terms his philosophy *empirical realism*, meaning that it holds to an existence of things in space independent of our particular states of consciousness, opposing it to *transcendental realism*, which asserts that time and space are something in themselves independent of our sensibility (*Crit. of Pure Reason*, 320–6, Müller's trans.). Spencer calls his philosophy *transfigured realism*, which means that '*some* objective existence, manifested under *some* conditions,' separate from and independent of

subjective existence, is the final necessity of thought, and yet that the perceptions and objects in consciousness are not the reality, and do not resemble, but only symbolize it. At the same time he marks this off from 'hypothetical realism,' because that only asserts the existence of this real as an inference, not as a 'fact' (*Psychol.*, ii. chap. xix). Lewes calls his theory *reasoned realism*, which he distinguishes not only from crude or natural realism, but also from the transfigured. It asserts that the reality of an external existence, a not-self, is given in feeling, and indissolubly woven into consciousness. Here realism seems to mean not externality to consciousness, but externality to the subject, or ego, in consciousness (*Problems of Life and Mind*, 176–95). See also REAL IDEALISM (or Ideal Realism).

We shall now take up realism in the first sense. In one aspect the problem goes back to Socrates, who asserted that the object of knowledge (and hence the true, the certain, the real) was the universal, endeavouring in this way to overcome the subjectivism of the Sophists. In Plato, the universals appear as the ideas and the true or absolute beings; and an exposition of the method of arriving at them, of their nature and interrelations, and their connection with the various forms of reality and experience constitutes the chief object of his philosophy. It was long fashionable to regard him as an extreme realist in the mediaeval sense, that is, as asserting the subsistence of universals by themselves, independent of any relation to individuals—*ante res*. Aristotle is largely responsible for this interpretation, since he continually polemicizes against the Platonic separation of the ideas; he is the authority with the Scholastics. But, in the first place, the ultimate reality with Aristotle, the pure form, has the same transcendence which he attributes to the Platonic idea, so far as existence is concerned. It is, at bottom, the lack of *dynamic* connection with the world which Aristotle, whether rightly or wrongly, criticizes in Plato—a lack which he attempts to fill by his theory of the form as the end, which matter as the potential always attempts to realize, and hence moves towards. But, in the second place, and more significantly, the whole mediaeval and modern conception of realism is foreign to the interests of Greek philosophy, both Platonic and Aristotelian. Plato and Aristotle are interested in showing that the real is universal, and under what conditions it becomes or is individual; but the interest in the obverse question, the reality of the universal and of the individual, is one which depends upon the whole intervening period, indicating indeed that the starting-point has been reversed. It could not arise until the psychological movement had gone far enough to correlate the universal and subjective thought.

This is not to say, of course, that mediaeval thought did not naturally and inevitably identify its own problems with those of Greek thought, and even cast them in the terms of that thought. Neo-Platonism, with its express derivation of the hierarchy of successive forms of thought and being from the more universal as the more real, was the immediate cause of this identification, so that realism is the first to make its appearance, which it does in full-fledged form in SCOTUS ERIGENA (q. v., and also SCHOLASTICISM). It is a matter of moment that realism is the doctrine of those who are especially interested in philosophic content, while nominalism appears, at first, rather as a merely formal and logical doctrine. As such, it is a passage in the translation by Boethius of Porphyry's introduction to the *Categories* of Aristotle which started the discussion—a treatise, it must be remembered, which at this period was known only quite apart from the metaphysics and physics of Aristotle. The passage raised the problem of genera and species, (1) as to whether they subsist in themselves or only in the mind; (2) whether, if subsistent, they are corporeal or incorporeal; and (3) whether separated from sensible things, or placed in them. Roscelin appears as an extreme nominalist, holding that the universals are only abstractions from particular things (are *post res*), and in themselves are only words (*voces*) or names (*nomina*). William of Champeaux asserted realism in its most extreme form. Only genera are substances; individuals are only their attributes; manhood is essential, Socrates accidental. Moreover, *every* universal is real; whiteness would be real even if there were no white thing. These extreme views obviously demanded some attempt at mediation. This was supplied by Abelard. He held that a universal, even as a name, is yet more than a name; it is a predicate, or *sermo*. This is reached only by conception, which, comparing individual things, reaches that which 'naturally' is a predicate. So far Abelard would be classed as a conceptualist. But he goes on to develop the idea of a *natural* predicate. Since universals are the instruments of all know-

ledge, there must be something in the nature of things which is their basis; namely, *similarity* in the things themselves. Moreover, this similarity is due to the fact that the universals are the modes or archetypes in God's mind, according to which he creates particular things—a view emphasized also by Bernard of Chartres and by Gilbert of Poitiers. The latter, however, leans more to realism in holding that while these concepts or forms of the divine mind become *universals* only in things, they are really in things (*in re*), and not merely factors of likeness to be apprehended (collected) in turn by the human mind. Here the discussion practically rests for the time; justice seems to be done to all the elements involved, and the doctrine being accepted by Alexander, and by Thomists and Scotists alike, in the second period of *scholasticism* the discussion passes into the background.

It did not wholly rest, however; those who continued the tradition of the merely formal logic, occupying themselves with *propositions* rather than with *judgments*, continued the old nominalistic terminology. What was termed 'modern logic,' depending upon some Byzantine compendiums, was developed. It involved the theory of the syllogism, in its different figures, in relation to component propositions, and the elements of these propositions—very much, indeed, what passes in the logic of the syllogism to-day. This was elaborated by Peter of Spain. According to it the predicate (which of course is the universal) is only a sign. With Peter and his school the doctrine remained a harmless detail of formal logic. But William of Occam develops it and combines it with a metaphysical theory of the nature of (distinct) individuals, which had come to the front. Realism, even in its moderate forms, seemed to find the essential reality in the generic, if not in or before things literally, at least as 'thoughts' in the mind of God. As long as the object of chief interest was the universe as a whole, and the Church and state as wholes, the doctrine naturally commended itself. But with the growth of consciousness of particular individuality (*haecceitas, this* special uniquely distinguished individual) the doctrine presented grave difficulties. It seemed to lead to a most thorough-going predeterminism, according to which everything in or about the individual is eternally foreordained in the thought of God. Duns Scotus had insisted upon the primal character of individuality (*haecceitas*), but had still regarded it as form, as the generic substantialized. But William of Occam recognized that this view still left the individual in an ambiguous position; logically, at least, the individual still appears as subordinate to the universal. Hence with him nominalism is not, as with the earlier writers, a merely negative assertion of the verbal or conceptual character of ideas; it is the positive assertion that specific individualities, differentiated in themselves, are the real; and that universals are discursively gathered from our original intuitive knowledge of these individuals. (In this direct apprehension, William includes both sensation, knowledge of our own internal states—more certain than sense-knowledge—and the intellectual intuition of the essence of the soul.) Just because Occam's theory was congruent with the rising practical individualism of the day (in politics and religion), because it agreed with the rising physical science—emphasizing the knowledge of particular phenomena instead of abstract and occult essences—and because it fell in with the growing psychological tendency to study the natural history of knowledge, and not simply its logical forms, nominalism became as triumphant at this period as realism had been at the earlier.

With the breaking up of mediaevalism, the discussion passed over into psychology. The interest was in abstract and general ideas, or abstraction and generalization, rather than in universals as such. Accordingly, our statement ends here—save to remark that, since modern science deals so evidently with universals, with laws, the problem of whether or no any objective reality is to be conceded to these universals, and if so, in what way, is coming to the front again in modern logic; and thus in so far the old discussion is again raised. In accordance with the spirit of an early remark, we may note from another point of view the difference of the ancient from the mediaeval realism. The ancient deals with the universal as the *essence*, the constitutive factor, whether before or in individuals; the mediaeval deals with it as the *generic*. Hence to an ancient to have identified the universal with a mere concept would have been impossible, save to assert absolute scepticism; with the moderns it was a natural outlet. With recent thought, the universal becomes law, or method. Cf. Latin and Scholastic Terminology.

Literature, to (1): Prantl, Gesch. d. Logik, is the authority for the details of practically all

writers. Cf. the titles cited under SCHOLASTICISM. The following are important: JOHN OF SALISBURY, Metalogicus, ii. chap. xvii ff. (gives a summary of views of previous writers, all the more valuable because he confesses himself unable to take any position); BARACH, Zur Gesch. d. Nominalismus vor Rocellin; LÖWE, Der Kampf zwischen Nominalismus u. Realismus; EXNER, Nominalismus u. Realismus; KÖHLER, Realismus u. Nominalismus. (J.D.)

To (2): (natural realism) works of REID, TH. BROWN, D. STEWART, MCCOSH (esp. Hist. of the Scottish Philos.); (French realism) works of JOUFFROY, BIRAN, COUSIN, JANET. See also the writers cited above and the histories of philosophy; the literature of EPISTEMOLOGY, and PHILOSOPHY, and BIBLIOG. B, 2, *d*. (J.M.B.)

Realism (in aesthetics). Primarily, a style or mode of artistic treatment which represents its objects as they 'really' or actually are, as opposed to IDEALISM (q. v.), which selects and modifies.

Practically, the artist must in any case select at least his object and point of view, hence the term has been determined largely by antithesis to the various meanings of idealism, giving three distinct species:—

(1) A treatment which emphasizes individuality, as contrasted with an idealism which emphasizes the TYPE (q. v.).

(2) A treatment which brings out especially the strong, harsh, and even ugly aspects of reality or life, as contrasted with an idealism which seeks the harmonious.

(3) A treatment which professes to make no selection on the ground of intrinsic aesthetic value, and to attempt no intensification of interesting features, but to reproduce all aspects of reality and all detail without discrimination or modification, contrasted with an idealism which selects and modifies according to the artist's aesthetic interest.

Owing to the confusion involved in these different antitheses, Volkelt suggests as a more useful pair of antitheses: (*a*) intensifying *versus* matter-of-fact (potenzierender Stil und Thatsachenstil); (*b*) individualizing *versus* typicizing (typisierender).

The various meanings of the term have grown out of the varying modes of art-consciousness of different periods. Cf. BEAUTY, ART, and CHARACTERISTIC. (J.H.T.)

In contrast with NATURALISM (q. v., in aesthetics), realism portrays what is essential to the individual or illustrates the concept of the individual; while naturalism fails to distinguish between what is essential and what accidental to the individual. Idealism depicts, on the other hand, what is general, and essentially general (cf. Alt, *Syst. d. Künste*). (K.G.)

Literature: VOLKELT, Aesth. Zeitfragen (1895), chap. iv; FECHNER, Vorschule d. Aesth. (1876), xxii, xxvii; SYMONDS, Essays Spec. and Sugg., 117 ff.; LA FARGE, Considerations on Painting (1896), chaps. ii, iii. (J.H.T.)

Reality: see REAL.

Reality Feeling and **Realizing Sense**: Ger. *Realitätsgefühl*; Fr. *sentiment de réalité*; Ital. *sentimento della realtà*. Reality feeling is 'the feeling which means, *as the child afterwards learns*, that an object is really there . . . contrasted with belief . . . which indicates the amount of assurance we have *at the time* that an object is there' (Baldwin, *Handb. of Psychol., Feeling and Will*, chap. iii, 'Interest, Reality Feeling, and Belief,' where the term was originally suggested).

The disturbance of reality feeling gives 'unreality feeling,' a certain distrust of experience leading to trial and error and the gradual grounding of things believed. Cf. BELIEF.

Realizing sense is a popular term for reality feeling, either with or without the intellectual conviction of explicit belief.

Literature: titles given under BELIEF, especially the books of JAMES, VORBRODT, STOUT, BALDWIN. (J.M.B.)

Realization: see SELF-REALIZATION, and cf. REALITY FEELING.

Realizing Sense: see REALITY FEELING.

Reals: Ger. *Realen*; Fr. *réels*, (*les*) *êtres*; Ital. *reali*. A term used by Herbart to name the (pluralistic) ultimate beings.

Each is a monad, and absolute in itself. A plurality of qualities in a being means a relative element. Hence each real is perfectly simple in quality. This quality is undefinable. These reals act upon one another by way of disturbance, and react to disturbance in the way of self-preservation. Presentations (Vorstellungen) are self-preservative reactions on the part of that real called mind. (J.D.)

Reason [Lat. *ratio*, through Fr.]: Ger. (1) *Verstand*, (2, 3) *Vernunft*; Fr. *raison*; Ital. *ragione*. (1) That faculty and process (*νοῦς, διάνοια, ratio*) of mind which consists in the drawing of inferences. See INFERENCE, and THOUGHT, and cf. REASONING.

It is in this wide sense that man is defined as a 'rational animal.' The term thus came to be applied to a special 'faculty' by means of which man was supposed to

draw inferences; but it has always tended to be restricted to that part of such supposed faculty by means of which he drew valid inferences from true premises. In this sense it is opposed to INSTINCT (q. v.).

(2) From the restriction of 'reason' to the valid inference of true conclusions was derived a further use, in which it denotes the supposed faculty by which we apprehend intuitively, or without inferring, truths which stand to particular judgments about what exists at this or that time or place, in the relation of a REASON (q. v., in logic) to its consequence.

In this sense reason is opposed to sensation, perception, and imagination, and also, especially where the truths in question are ethical principles, to feeling and desire.

By the term PRACTICAL REASON (q. v.) is meant either a special faculty or a part of the general faculty of reason, which is supposed both (*a*) to apprehend the reason why particular actions ought to be performed, i.e. either the principle from which their rightness follows, or the fact that they are means to an end, and (*b*) to cause the performance of such actions. [The Aristotelian sense is that of 'reason directed towards the attainment of an end.'—A.S.P.P. See PRACTICAL REASON (1).]

(3) By a still further distinction reason is restricted to the faculty by which we are supposed to apprehend the real nature of the world as a whole, or the one ultimate reason of all consequences. The term is still applied to the mind, in so far as it is supposed to exercise this function, although the doctrine of particular faculties has been generally given up. Cf. UNDERSTANDING AND REASON.

The word λόγος is vaguely used to cover all senses of reason, but is less frequently used to denote the psychological fact of belief. In Aristotle it is mainly restricted to mean the definition of a thing, including the verbal description of that 'formal cause,' which Plato and Aristotle alike supposed to be one of the reasons of a thing's existence. Aristotle uses the word ἀρχή to cover reason in the proper sense; and he distinguishes as a less proper use of the term that in which it stands for any true proposition from which another is inferred actually (*a*), a distinction which gave rise to the scholastic distinction between *ratio cognoscendi* and *ratio essendi*, of which also it is recognized that the latter is more properly called reason. These two terms correspond respectively to consequence and reason, in their proper sense, except that the former sometimes includes the cause of our knowing a truth, and the latter the cause of a thing's existence. Leibnitz uses the term SUFFICIENT REASON (q. v.) to denote a kind of 'final cause,' which he supposes to be the only true cause of every event. See CAUSE.

The word νοῦς covers vaguely all meanings of reason [and is especially used in distinction from understanding, ἐπιστήμη or διάνοια — A.S.P.P.]; but it tends to be confined by Plato and Aristotle to the faculty by which we apprehend true reasons without inference, and to be distinguished from other generally synonymous words, such as διάνοια, as denoting the faculty by which we apprehend the most ultimate truths. The Stoics, by personifying the λόγος, of which Heraclitus had spoken as the law of all changes in the universe, gave to this word much the same meaning as belonged to νοῦς in Plato and Aristotle.

The use of both words was continued by Philo, by the Christian Fathers, and by the Neo-Platonists, νοῦς being sometimes applied, as by Philo, to the human reason as a part of the one divine λόγος, and sometimes, e. g. by Valentine and Plotinus, to an entity conceived as superior to that which they denote by λόγος. It is from this use of λόγος, through its Latin equivalent, *ratio*, that our use of reason to denote a mental faculty is derived. The antithesis between reason and revelation, emphasized by Christian Apologists against the Gnostics and Neo-Platonists, prepared the way for the scholastic use of 'ratio' to denote our capacity for drawing valid inferences of which the results are not necessarily true—a use in which it was opposed to that 'faith' by which we were supposed to apprehend revealed truths. This use alone dominated mediaeval philosophy, culminating in the avowed doctrine that unorthodox deductions might be true *secundum rationem*, although in flat contradiction to what was true *secundum fidem*. After the Renaissance the vague use of reason to mean the faculty by which we apprehend abstract truths, with or without inference, again became prominent; and a more definite meaning was first brought into vogue by the distinction of Kant's between reason and understanding—a distinction also adopted by Hegel. (G.E.M.)

Reason (in logic): Ger. *Grund*; Fr. *raison*; Ital. *ragione*. One or more of the propositions from which another is validly inferred. See REASONING, and SUFFICIENT REASON. (J.M.B.)

Reason (in theology). The concrete intelligence of man as exercised in the discovery or apprehension of religious truth.

Reason in this sense includes intuition in so far as that function yields ideas and concepts. It is to be distinguished, however, from intuition regarded as a mere subjective sense. The great distinction in theology, however, is that which exists between reason and a faith resting on some objective or external authority. It is generally conceded that what is intrinsically irrational cannot be a legitimate object of faith.

Literature: see RATIONALISM, REVELATION, and SUPERNATURALISM. (A.T.O.)

Reason (sufficient): see SUFFICIENT REASON, and REASON (in logic).

Reasonable (1) and (2) **Unreasonable**: Ger. *vernünftig, unvernünftig*; Fr. *raisonnable, déraisonnable*; Ital. *ragionevole, irragionevole*. (1) Having, and (2) not having, what is considered adequate ground or justification. See REASON (in logic), and cf. RATIONAL.

The terms — notably unreasonable — are especially (though not exclusively) applied to actions or active decisions, attitudes, &c., having reference to the element of conation which enters into these. We say a conclusion or inference is illegitimate, wrong, or false, but the act based upon this conclusion we call 'unreasonable.' Moreover, there is a slight reproach attaching to a course that is unreasonable which does not attach to what is merely mistaken or ill-judged—a further indication that an element of conation is involved. (J.M.B.)

Reasoned Realism: see REALISM (2).

Reasoning: Ger. *Schliessen* (inference), *Denken* (thought); Fr. *raisonnement*; Ital. *ragionamento*. Thinking in logical form, correct or incorrect.

'Direct' reasoning or inference is the case in which the proof proceeds directly to the conclusion; an 'indirect' conclusion follows from the proof of something else (see PROOF). 'Deceptive reasoning' is reasoning which involves a logical fallacy. (J.M.B.)

Reasoning is a process in which the reasoner is conscious that a judgment, the conclusion, is determined by other judgment or judgments, the premises, according to a general habit of thought, which he may not be able precisely to formulate, but which he approves as conducive to true knowledge. By true knowledge he means, though he is not usually able to analyse his meaning, the ultimate knowledge in which he hopes that belief may ultimately rest, undisturbed by doubt, in regard to the particular subject to which his conclusion relates. Without this logical approval, the process, although it may be closely analogous to reasoning in other respects, lacks the essence of reasoning. Every reasoner, therefore, since he approves certain habits, and consequently methods, of reasoning, accepts a logical doctrine, called his *logica utens*. Reasoning does not begin until a judgment has been formed; for the antecedent cognitive operations are not subject to logical approval or disapproval, being subconscious, or not sufficiently near the surface of consciousness, and therefore uncontrollable. Reasoning, therefore, begins with premises which are adopted as representing percepts, or generalizations of such percepts. All the reasoner's conclusions ought to refer solely to the percepts, or rather to propositions expressing facts of perception. But this is not to say that the general conceptions to which he attains have no value in themselves.

Reasoning is of three elementary kinds; but mixed reasonings are more common. These three kinds are *induction*, *deduction*, and *presumption* (for which the present writer proposes the name *abduction*).

Induction takes place when the reasoner already holds a theory more or less problematically (ranging from a pure interrogative apprehension to a strong leaning mixed with ever so little doubt); and having reflected that if that theory be true, then under certain conditions certain phenomena ought to appear (the stranger and less antecedently credible the better), proceeds to *experiment*, that is, to realize those conditions and watch for the predicted phenomena. Upon their appearance he accepts the theory with a modality which recognizes it provisionally as approximately true. The logical warrant for this is that this method persistently applied to the problem must in the long run produce a convergence (though irregular) to the truth; for the truth of a theory consists very largely in this, that every perceptual deduction from it is verified. It is of the essence of induction that the consequence of the theory should be drawn first in regard to the unknown, or virtually unknown, result of experiment; and that this should virtually be only ascertained afterward. For if we look over the phenomena to find agreements with the theory, it is a mere question of ingenuity and industry how many we shall find. Induction (at least, in its typical forms) contributes nothing to our knowledge except to tell us approximately how often, in the course of such experience as our experiments go towards constituting, a

given sort of event occurs. It thus simply evaluates an objective probability. Its validity does not depend upon the uniformity of nature, or anything of that kind. The uniformity of nature may tend to give the probability evaluated an extremely great or small value; but even if nature were not uniform, induction would be sure to find it out, *so long as inductive reasoning could be performed at all.* Of course a certain degree of special uniformity is requisite for that.

But all the above is at variance with the doctrines of almost all logicians; and, in particular, they commonly teach that the inductive conclusion approximates to the truth because of the uniformity of nature. They only contemplate as inductive reasoning cases in which, from finding that certain individuals of a class have certain characters, the reasoner concludes that every single individual of the class has the same character. According to the definition here given, that inference is not inductive, but is a mixture of deduction and presumption. Cf. INDUCTION, and PROBABLE INFERENCE.

On the methods of inductive reasoning see DIFFERENCE (method of), CONCOMITANCE (logical), AGREEMENT (method of), and Elimination under SCIENTIFIC METHOD. For Eliminative Reasoning (Ausschlussverfahren —Eisler) see SYLLOGISM.

Presumption, or, more precisely, *abduction* (which the present writer believes to have been what Aristotle's twenty-fifth chapter of the second *Prior Analytics* imperfectly described under the name of *ἀπαγωγή*, until Apellicon substituted a single wrong word and thus disturbed the sense of the whole), furnishes the reasoner with the problematic theory which induction verifies. Upon finding himself confronted with a phenomenon unlike what he would have expected under the circumstances, he looks over its features and notices some remarkable character or relation among them, which he at once recognizes as being characteristic of some conception with which his mind is already stored, so that a theory is suggested which would *explain* (that is, render necessary) that which is surprising in the phenomena.

He therefore accepts that theory so far as to give it a high place in the list of theories of those phenomena which call for further examination. If this is all his conclusion amounts to, it may be asked: What need of reasoning was there? Is he not free to examine what theories he likes? The answer is that it is a question of economy. If he examines all the foolish theories he might imagine, he never will (short of a miracle) light upon the true one. Indeed, even with the most rational procedure, he never would do so, were there not an affinity between his ideas and nature's ways. However, if there be any attainable truth, as he hopes, it is plain that the only way in which it is to be attained is by trying the hypotheses which seem reasonable and which lead to such consequences as are observed.

Presumption is the only kind of reasoning which supplies new ideas, the only kind which is, in this sense, synthetic. Induction is justified as a method which must in the long run lead up to the truth, and that, by gradual modification of the actual conclusion. There is no such warrant for presumption. The hypothesis which it problematically concludes is frequently utterly wrong itself, and even the method need not ever lead to the truth; for it may be that the features of the phenomena which it aims to explain have no rational explanation at all. Its only justification is that its method is the only way in which there can be any hope of attaining a rational explanation. This doctrine agrees substantially with that of some logicians; but it is radically at variance with a common theory and with a common practice. This prescribes that the reasoner should be guided by balancing probabilities, according to the doctrine of inverse PROBABILITY (q. v.). This depends upon knowing antecedent probabilities. If these antecedent probabilities were solid statistical facts, like those upon which the insurance business rests, the ordinary precepts and practice would be sound. But they are not and cannot, in the nature of things, be statistical facts. What is the antecedent probability that matter should be composed of atoms? Can we take statistics of a multitude of different universes? An objective probability is the ratio of frequency of a specific to a generic event *in the ordinary course of experience.* Of a fact *per se* it is absurd to speak of objective probability. All that is attainable are subjective probabilities, or likelihoods, which express nothing but the conformity of a new suggestion to our prepossessions; and these are the source of most of the errors into which man falls, and of all the worst of them. An instance of what the method of balancing likelihoods leads to is the 'higher criticism' of ancient history, upon which the archaeologist's spade has inflicted so many wounds. Cf. PRESUMPTIVE INFERENCE.

The third elementary way of reasoning is *deduction*, of which the warrant is that the facts presented in the premises could not under any imaginable circumstances be true without involving the truth of the conclusion, which is therefore accepted with necessary modality. But though it be necessary in its modality, it does not by any means follow that the conclusion is certainly true. When we are reasoning about purely hypothetical states of things, as in mathematics, and can make it one of our hypotheses that what is true shall depend only on a certain kind of condition—so that, for example, what is true of equations written in black ink would certainly be equally true if they were written in red—we can be certain of our conclusions, *provided no blunders have been committed.* This is 'demonstrative reasoning.' Fallacies in pure mathematics have gone undetected for many centuries. It is to ideal states of things alone—or to real states of things as ideally conceived, always more or less departing from the reality — that deduction applies. The process is as follows, at least in many cases:

We form in the imagination some sort of diagrammatic, that is, iconic, representation of the facts, as skeletonized as possible. The impression of the present writer is that with ordinary persons this is always a visual image, or mixed visual and muscular; but this is an opinion not founded on any systematic examination. If visual, it will either be geometrical, that is, such that familiar spatial relations stand for the relations asserted in the premises, or it will be algebraical, where the relations are expressed by objects which are imagined to be subject to certain rules, whether conventional or experiential. This diagram, which has been constructed to represent intuitively or semi-intuitively the same relations which are abstractly expressed in the premises, is then observed, and a hypothesis suggests itself that there is a certain relation between some of its parts—or perhaps this hypothesis had already been suggested. In order to test this, various experiments are made upon the diagram, which is changed in various ways. This is a proceeding extremely similar to induction, from which, however, it differs widely, in that it does not deal with a course of experience, but with whether or not a certain state of things can be imagined. Now, since it is part of the hypothesis that only a very limited kind of condition can affect the result, the necessary experimentation can be very quickly completed; and it is seen that the conclusion is compelled to be true by the conditions of the construction of the diagram. This is called 'diagrammatic or schematic, reasoning.'

Literature: F. A. Lange, Logische Stud. (1877, unfinished); J. S. Mill, A System of Logic (1842); treatises on logic generally; many treatises on psychology, in loc.; Bibliog. C, 2, *j*, *k*. (C.S.P.)

Recall: see Revival.

Recapitulation (law of) [Lat. *re* + *caput*, head, through Fr.]: Ger. *Wiederholungsgesetz*; Fr. *loi de récapitulation*; Ital. *legge di ricapitolazione*. The theory according to which the individual in his ontogenic development passes through a series of stages which represent successive forms in the descent of the species (phylum) to which he belongs; the theory that ontogenesis recapitulates phylogenesis. Cope suggested the term 'Bioblastology' for the science of the relation of the two genetic series of forms. Cf. Ontogeny.

The facts were recognized—so far as the parallelism is concerned—by Agassiz, and formulated, for the development of the embryo, by v. Baer (see v. Baer's Law). Haeckel interpreted the principle as a law of evolution. It is now very generally recognized as, in principle, true, although liable to much variation due to other forces and conditions. Modifications of it have been formulated in the 'law of Acceleration' (q.v.), and the theory of abbreviation, with that of Short Cuts (q.v.). Eimer (*Organic Evolution*, Eng. trans., 30) makes the following general statement regarding abbreviation: 'Every lower stage of the phyletic growth is abbreviated [in ontogeny] for the benefit of the newer [higher].' Variations in the series have been recognized as arising from the necessary accommodation of the organism to changed environment, and the effects of mechanical forces, of unlike and unequal food-supply, &c. (Sedgwick). Moreover, it has been pointed out, by the present writer, that the rigid working of recapitulation must have been subordinated to the requirements of the creature's own survival—variations in recapitulation coming under the action of natural selection. Thus the rise of an infancy period is necessitated by the demands of later life in creatures in which plasticity and intelligence take the place of fixity and instinct. Such creatures are born helpless, and depend upon parental care, thus failing to pass through the stage of rich instinctive endowment which would correspond to that of their ancestors. So

in the child we find few perfect instincts, and only those—such as sucking, walking reflex, &c.—which are of continued utility, or at least not of actual inutility, in the development of the future mature being whose life is mainly one of intelligent learning. Yet there are, it would seem, even in such cases, sufficient indications of the general operation of recapitulation.

The facts upon which this law is based afford one of the strongest arguments for the theory of organic evolution. How, it may be asked, could the individual's hereditary impulse have come to take this course through a series of forms arranged in order, analogous to a series of adult forms, except by being in the actual line of descent from those forms, which have thus handed down these rudimentary or vestigial (see VESTIGE) indications? And further: how could the line of progress in the individual's development take place, except by actual continuity of material and of vital change from one of these stages to another? So the production of the original series of animal forms, which this recapitulates, must have involved continuity of substance and actual descent by heredity. If these two points be put together—a creature (1) itself showing the actual production of these forms one from another, and (2) itself in the series by hereditary descent—the presumption of evolution is overwhelming.

The term 'parallelism' has been used for the fact of recapitulation especially by Hyatt and Cope (*Prim. Factors of Org. Evolution*, 175 ff.); it is better, however, to restrict that term to psychophysical PARALLELISM (q. v.). The two last-named writers hold, on the basis of discoveries by Hyatt, to a further 'parallelism' between old-age degeneration and racial degeneration (see Cope, as cited above, and cf. ONTOGENY).

Literature: see under v. BAER'S LAW, EVOLUTION, EVOLUTION (mental), and ONTOGENY; MILNES MARSHALL, Lectures and Addresses (being Pres. Address. Brit. Assoc. 1890); also citations in DELAGE, Structure du Protoplasma, and successive issues of the Année Biol. (J.M.B., C.LL.M., E.B.P.)

Recept [Lat. *recipere*, to take back]: not in use in the other languages. A word used by Romanes for the mental images supposed to be formed merely by the repetition of percepts leading to reinforcement of the characters in which the percepts agree, and obscuration of the characters in which they differ. The ordinary psychological term applied in this connection is GENERIC IMAGE (q. v.). (G.F.S.)

Receptivity [Lat. *recipere*, to take back]: Ger. *Receptivität* (Kant), *Empfänglichkeit*; Fr. *réceptivité*; Ital. *recettibilità*. (1) The receptive—i. e. sensory, cognitive, and suggestive—functions as set over against the motor, expressive, and active.

(2) Sensitiveness or responsiveness to stimulation of the receptive functions.

A person is said to be by nature receptive to 'suggestion,' to instruction, &c., or to have great receptivity. Receptibility (with receptible) is also used in this sense.

(3) With Kant, Receptivität is the faculty of presentation (Vorstellen) when stimulated by objects, as over against Spontaneität, in which presentations are brought up by the mind itself ('das Vermögen, Vorstellungen selbst hervorzubringen'; *Krit. d. reinen Vernunft*, 76; quoted by Eisler). (J.M.B., G.F.S.)

Reciprocal Demand: Ger. *gegenseitige Nachfrage* (little used); Fr. *demande réciproque*; Ital. *domanda reciproca*. The relation between two kinds of goods in the same market, wherein either may be regarded as a cause of demand for the other.

If we regard demand not in the sense of quantity demanded, but of purchasing power offered, the source of the demand for one commodity is the supply of others; and each commodity brought to market appears in the double aspect of supply and (source or measure of) demand. The logical consequences arising from this view of the matter were well developed by Cairnes, and still better by Walras, who has made them the subject of acute mathematical analysis. But the superior convenience of the other definition of demand as quantity demanded has prevented most economists from adopting this method of treatment. (A.T.H.)

Reciprocity [Lat. *reciprocatus*, from *recipere*, to receive]: Ger. (1) *Wechselwirkung*, (2) *Widerspiel*; Fr. (1) *échange mutuel*, (2) *réciprocité*; Ital. (1) *scambio mutuo*, (2) *reciprocità*. (1) Relation of MUTUALITY (q. v.); mainly used (*a*) for the action and reaction of all bodies upon one another: Kant's CATEGORY (q. v.) of reciprocity; and (*b*) for the supposed relation of mutual cause and effect between mind and body.

(2) Interaction; double relation of give and take, whether the two relations between giver and taker be the same or not; that is, whether mutuality be present or not.

'Interdependence' is often used to cover

both meanings given, and also INTERACTION (q.v.).

Literature: see CATEGORY, and INTERACTION. (J.M.B.)

Recognition [Lat. *re* + *cognitio*, knowledge]: Ger. *Wiedererkennen* (*-nung*); Fr. *reconnaissance, récognition* (sometimes used—L.M.); Ital. *riconoscimento, ricognizione*. The consciousness accompanying any mental object when it is apprehended as having been apprehended before.

The principal facts to be covered fall under certain headings: (1) The ordinary recognition of an object as having been apprehended before—as having 'individual identity.' (2) The recognition of an image as a memory of an object before experienced. (3) The recognition of an object as being the same, although not having the marks of individual identity—as having 'material identity,' i.e. a chair, every part of which has been at some time replaced. (4) The recognition of an object as belonging to a familiar class, although itself as an individual not familiar: 'class recognition.' (5) Recognition as attaching to the categories, schemes, or forms of mental process; as to a familiar train of thought, a mathematical demonstration, &c., in which the matter may not be the same: what may be called 'formal' or 'logical' recognition. (6) The element of self-recognition, which seems to be present in many cases of the recognition of an object. (7) The distinction between (*a*) relative recognition, in which certain relationships of part to part and part to whole are involved, and (*b*), in which an absolutely simple quality (e.g. a musical tone; see TONE RECOGNITION) is recognized with no aid from its relationships within or without itself. (8) Illusions of recognition, in which the objects of recognition belonging to the several classes above are falsely held to be familiar.

Theories turn mainly upon the first of these sorts of recognition; but the demand may fairly be made that the final theory explain them all. The principal current views are as follows:

I. Representation theories, which hold that a certain duality as between the former and the latter appearance of the object must enter into recognition: there is a representative or ideal ingredient which gives to the new cognition its value of familiarity. Of these theories we have the following:

(*a*) The Image theories. According to this view we recognize an object by means of a memory image of the same object as earlier experienced. The memory image is recalled, and it is found to be the same with the new presentation, hence the latter has its identification. This theory is now generally abandoned in view of the evidence that in many cases of recognition there is no such revived image.

(*b*) The Assimilation theory. According to this point of view, while there may not be a distinct memory image of the object felt to be familiar, yet there are, in the construction of the object the second time, elements of revived content. These, together with memory elements having more or less conscious value, which do not thus enter into the construction, give the quality of familiarity. The new object is said to be assimilated to the old, so that there is only one mental construction—not an image plus a percept. This is part of the broader theory of ASSIMILATION (q.v.), by which association of ideas is also explained, recognition involving association of a certain sort.

II. The Presentation theories. These take as point of departure, as opposed to the representation view, some mark, quality, or 'coefficient' in the thing recognized, whereby it is apprehended as familiar. What is this quality?—that question gives rise to various more specific views.

(*a*) Physical theories. The recognition coefficient is said to be physical; a certain result left in the brain paths or centres whereby, on the recurrence of the same sort of stimulation or function, a peculiar quale is imparted to the conscious state; this is the feeling of familiarity.

This may be a true statement so far as the fact of nervous HABITUATION (q.v.) is concerned; but it is not a psychological explanation, and so can never be confirmed. If this be all, then the mental coefficient is an ultimate psychic fact or quale, and analysis can go no further.

(*b*) Objective theories. By these the coefficient is said to be something in the presentation; some character whereby it is different from the original object, but just by this difference is identified objectively with it. This theory finds the element of sameness in the relative complexity of the two presentations alike, and makes the recognition dependent upon the reinstatement of the internal relationships of the content recognized as a whole.

There is much evidence in support of this

view. Complex presentations—as a human face—are recognized with relative certainty and ease; simple ones—a musical tone—with difficulty or not at all. Experiments have indeed made it fairly certain that for the ordinary cases of individual recognition, relative complexity of content enhances recognition. It is evident, however, apart from cases of recognition in which this complexity is not present, that this may be only a means or stimulus to the real recognition process, i. e. that the coefficient may be something yet more recondite to which this objective complexity contributes, but to which it is not essential.

III. Subjective or Functional views. These look upon the mechanism of the mental process, rather than the character of the object, as the locus of recognition.

(*a*) The Psychophysical Functional view: which makes the principle of habituation apply to the whole function rather than to the physical merely (II, *a*, above). This, however, in itself is open to many interpretations, according as this or that aspect of the entire act of representation is taken into account. This view therefore tends to pass over into either a purely physical theory or into some view which arises by analysing the mental process to locate the actual coefficient. This view as a whole is then distinguished as—

(*b*) The Psychical Function view. It takes on several forms, each in turn reaching a more restricted field of mental data and attempting a broader outlook upon the facts.

(i) The Mental Habit view: which simply asserts that the mental life is dominated by a law of habit; and this habit, which depends upon repetition or reinstatement of function, is reflected in consciousness as feeling of familiarity, when the objective repetition stimulates it. If this theory is more than a mystic analogy from physical habituation, it reduces to the latter; if made more precise, it takes on one of the following forms:

(ii) The Mental Disposition theory. This finds that all mental function in some way sets a tendency to the performance of the same or of analogous functions. It makes use of the facts upon which the law of Relativity (q. v.) of sense qualities is based, and which show that the mental life is continuous, and that all process is a resultant of two factors—first, the direct present stimulation, and second, the foregoing mental process. The latter factor is the mental disposition; consciousness is disposed or predisposed to certain functions. This colours the results of new process, and this colouring in the case of repeated experience is the consciousness of familiarity. This view, in so far, gathers up the facts better than any other. It accounts for the ease of objective recognition, since greater complexity and definition are then imparted to the dispositions involved. It accounts for 'absolute' recognition, since it is not dependent upon objective complexity of stimulation. It accounts for illusions of recognition, since the dispositions may become predominant and so give a false colouring to an object of presentation. Its defect is its generality and lack of determination of the actual basis of what is called the disposition involved.

(iii) Motor and Emotion theories.

(*a*) General theories: which accept the disposition view, but restrict the dispositions involved in recognition to those of conative or affective character. Of these, the recent theory of 'affective memory,' which involves direct recognition of affective states as such, is possibly of some importance. The 'synergy' theory holds to the flowing together of old and new motor processes in the act of recognition analogous to—or to account for—the 'assimilation' presupposed by the theory of that name above (I, *b*).

(*β*) Attention theories. These accept the theory of psychic disposition, but narrow down the application in this case to the dispositions of the attention. Attention, it is held, is rendered easier by repetition. This sense of facilitated attention is the subjective side of recognition, and constitutes the coefficient.

This theory, it is held by its advocates, has all the advantages of the functional theory in general, and gains besides from its definiteness. The attention is the vehicle of all cognition or cognitive synthesis; hence variations of the psychophysical process of attention arise from all degrees and forms of relative simplicity or complexity, as well as from different qualities and intensities, of presented contents. Attention furthermore attends all the higher operations of mind. The reinstatement of a mental object, of any character, will be attended by relative dispositional facility, not of attention in general, but of the peculiar attention—visual, auditory, affective, conative, logical, &c.—which is a reflex of the content in question. This relative disposition of attention is the coefficient of the object apprehended as familiar.

If we employ the formula for the analysis

of the ATTENTION (q. v.) given under that topic—*Att.* (attention) = $A + a + a$, we have three categories of attentive recognition of mental objects: first, variations in a—the elements of attention to particular objects, such as sensations of visual accommodation, &c.—give recognition of individual objects (e.g. my pen, recognized visually, is the same I wrote with yesterday). Second, variations in a—the elements common to objects of the same class, but varying for different classes, as cognized by visual, auditory, or other attention—give recognition of objects as not individually familiar but as belonging to a familiar class; such as the recognition of the pen as a pen, not a pencil or a penknife. Thus this theory accounts for a class-recognition. Third, the variations in A—the fundamental groundwork of sensations, &c., common to all acts of attention—give recognition to the great categories, definitions, or modes of experience and thought within which classes of objects are subsumed and treated (e. g. the material IDENTITY, q. v., of objects as spoken of above.)

This last form of recognition has never had statement as a problem of recognition co-ordinate with the others, and there are no theories save this to account for it. It amounts to a genetic theory of the origin of the mental categories considered as modes of classifying and treating experiences. The problem of class recognition also gets its best solution on this theory.

(γ) The Self-recognition theory: the view that the recognition of an object always involves a certain emphasis or assertion of self as being present and also as being the same at both occurrences of the object. This theory, however, requires an analysis of the self thus recognized, and a theory of the act of recognition of this self. It seems to have justice done it in the subjective or functional theories, especially by the 'attention' theory; for it is rather the general or formal presence of the self that accompanies the recognition of the object, than a distinct act of apprehension of the self as such. This formal self is implicit in the function by which the act of recognition of the object is accomplished.

It should be borne in mind that the theories now mentioned are not by any means in all cases mutually exclusive. Many avail themselves of two or more of the explanations offered, or hold, besides the main explanation, various subsidiary hypotheses. For example, the 'attention' theory is also a 'synergy' theory with respect to the way the dispositions fuse with the newly stimulated attention processes, an 'assimilation' theory with respect to the actual relation of the new objective content to old memory images and sensational revived contents, and a 'subjective' theory with respect to the question as to whether the essential coefficient of recognition attaches to the object recognized or resides in the mental function of apprehension.

Literature (after certain of the authors' names a catchword is given to indicate the class of views which they respectively hold): the topic 'Recognition' in the psychologies of JAMES (physical), HÖFFDING (psychophysical, functional), STOUT (disposition), WUNDT (habit, assimilation), LIPPS (subconscious image), LADD (ultimate datum: 'recognitive memory'), MCCOSH (self), BALDWIN, Ment. Devel. (attention). The older works, such as HAMILTON, Lects. on Met., and BROWN, Inq. into the Phenom. of the Human Mind, hold the 'Image' view. See the literature of MEMORY. On the recognition of affective states see HORWICZ, Psychol. Analysen; RIBOT, Imagination créatrice; URBAN, Psychol. Rev., July, 1901 (with literary citations). On 'absolute' (and 'relative') recognition see under TONE RECOGNITION. For experimental researches, see MEMORY (experiments on). (J.M.B., G.F.S.)

Recognition (absolute and relative): see RECOGNITION, passim, and TONE RECOGNITION.

Recognition (experiments on, and method of): see MEMORY (experiments on).

Recognition (Hegel's Anerkennung): see ACCEPTANCE.

Recognition Marks (or **Markings**): Ger. *Erkennungszeichen*; Fr. *signes récognitifs*; Ital. *segni di reconoscimento*. Those characters by which animals, especially those of the same species, recognize one another.

The view that the utility of various markings—colour, &c.—is that of aiding recognition for mating and other purposes has been developed by Wallace (*Darwinism*, 1891, 217 ff.; see also Poulton, *Colours of Animals*, 210 ff. and Index; and Gulick, *Nature*, Apr. 1, 1897). (J.M.B., E.B.P.)

Recollection [Lat. *re* + *colligere*, to collect]: Ger. *willkürliche Reproduction*; Fr. *reproduction volontaire*; Ital. *ricordanza*. Volitional REPRODUCTION (q. v.); reproduction following and controlled by the volition to reproduce. (G.F.S.–J.M.B.)

Recovery [Lat. *recuperare*, through Fr. *recouvrer*, to regain that which was lost]: Ger.

(*Wieder-*) *Genesung* (of health), *Erholung*; Fr. *convalescence* (of health), *recouvrement*; Ital. *ricuperamento*. The process of regaining normal condition after fatigue, disease, or injury. If not complete it is termed 'partial recovery.' (C.F.H.)

Rectitude [Lat. *rectitudo*, from *rectus*, right]: Ger. *Rechtlichkeit*; Fr. *rectitude*; Ital. *rettitudine*. (1) Formal Rightness (q.v.); cf. also Equivocation.

(2) Correct moral habit and disposition.

This usage is essentially based on meaning (1), since it takes account primarily of the will to do right rather than its accomplishment. In rectitude, in both senses, stress is laid on the more precise—and sometimes austere—recognition of the claims of justice, self-denial, and those virtues generally which fulfil the letter of obligation. (J.M.B.)

Recurrent [Lat. *recurrere*, to run back]: Ger. *recidivirend*; Fr. *récurrent*; Ital. *ricorrente*. Reappearing after intervals. Recurrent insanity is a well-known type, particularly in mania. Cf. Periodicity. (J.J.)

Recurrent Resemblance: see Resemblance (table, II).

Recurrent Vision: Ger. the Eng. term, also *Purkinje-Nachbild, Nachbild nach kurzdauerndem Reize*; Fr. *vision périodique, image récurrente positive*; Ital. *visione ricorrente*. After brief excitation, the positive After-image (q.v.) has been found to consist of several successive or 'recurring' stages, interrupted by negative phases.

C. A. Young: 'When, in a darkened room, the eye is screened from the direct light of the [intense Leyden jar] spark, the illumination produced is sufficient to render everything in the apartment perfectly visible; and what is remarkable, every conspicuous object is seen *twice* at least, with an interval of a trifle less than one-quarter of a second—the first time vividly, the second time faintly; often it is seen a third, and sometimes, but only with great difficulty, even a fourth time. The appearance is precisely as if the object had been suddenly illuminated by a light at first bright, but rapidly fading to extinction, and as if, while the illumination lasted, the observer were winking as fast as possible. . . . I have ventured to call the phenomenon recurrent vision' (*Amer. J. of Sci. and Art*, iii, Mar. 1872; cf. *London, &c., Philos. Mag.*, May, 1872). In Germany the phenomenon is associated with the name of Purkinje (as cited below).

Analogous phenomena have been described by others. C. A. Davis (art. 'Recurrent Vision,' *London, &c., Philos. Mag.*, xliv, 1872, Suppl., 526) gives the following: 'If the end of a piece of charcoal be made red-hot in a flame, and then moved about in the dark so as to describe an ellipse or circle a few inches in diameter, a blue image of the burning end is seen following the charcoal at a short distance behind it. The space between the charcoal and the blue image is as dark as the surrounding space.'

The following experiment described by Charpentier was made by him the basis of a hypothesis of retinal oscillation, which has now been used by him to explain colour vision. Rotate slowly a black disk that has a white sector of 90°; fixate the centre; the retreating black edge is followed by a narrow shadowy sector in the white. (E.B.T.–J.M.B.)

Bosscha (who has since been confirmed by others) speaks of the secondary, the tertiary, and the quaternary stage; the last being the regular negative after-image. Counting the dark intervening phases, there would be seven stages in all. This alternation of images was disquieting to those who believed the phenomenon to be retinal, and induced some to refer the whole process of the after-image, and consequently the extinguishing of complementary colors also, to the cortex. But the subject has been very much cleared up by Munk (*Zeitsch. f. Psychol.*, xxiii, 1900). He finds that the real course of the phenomenon is that the gradually falling away original excitation undergoes a sudden, delayed shock of contrast from the surrounding dark field; this constitutes the secondary image (which is of complementary colour with the first); after this is over, the regularly diminishing original excitation is again perceived. The proof is that the whole phenomenon is lacking, including the change of colour, if there is no dark contrasting background. The fact that the phenomenon is found (at least, by some observers) not to occur when the fovea only is stimulated (v. Kries, Hamaker) points to the achromatic apparatus (the rods) as the source of the sudden (secondary) accession of brightness. That in colour the after-image changes from positive to negative when white light is thrown upon it is the common rule. In view of this result, the best name for the positive After-image (q.v.) is *persistent retinal image* (Parinaud), as affording an indication of its character.

The phenomena are markedly different (Hamaker), according as the method of looking

for a short time at a resting light (method of Brücke, 1851), or that of fixating a point while a light moves through the field of view (method of Purkinje), is employed. (C.L.F.)

Literature: E. Brücke, Pogg. Ann. d. Phys. u. Chemie, lxxxiv. 418; J. Purkinje, Beobacht. u. Versuche zur Physiol. d. Sinne; Hess, Pflüger's Arch., xlix. 190; Bosscha, Arch. f. Ophthal., xl. 1; Bidwell, Proc. Roy. Soc. Lond., lvi. 132; v. Kries, Zeitsch. f. Psychol., ix. 81, xii. 181, xix. 175; and v. Graefe's Arch., xlii. (3) 95; Hess, v. Graefe's Arch., xl. (2) 259, xliv. 445; Hamaker, Zeitsch. f. Psychol., xxi. 1; Young, Munk, as cited above. Also see Sanford, Course in Exper. Psychol., expt. 160; Charpentier, Comptes Rend. (1891), cxiii. 147 (referring to communication to the Soc. de Biol., Mar. 10, 1900, 217, 278); and Arch. de Physiol. (1892), 541, 629; Titchener, Exp. Psychol. (1901), expt. 4. (C.L.F.–E.B.T.–J.M.B.)

Redeemer [Lat. *redimere*, to redeem]: Ger. *Erlöser*; Fr. *Rédempteur*; Ital. *Redentore*. The term applied to Jesus Christ as the rescuer and saviour of men from sin and its effects. Applied in a secondary sense to religious prophets in general. (A.T.O.)

Redemption [Lat. *redemptio*, from *redimere*, to redeem]: Ger. *Erlösung*; Fr. *rédemption*; Ital. *redenzione*. In Christian theology, salvation from sin and its effects through the atoning work of Jesus Christ.

Redemption is a name for the scheme of Christian salvation as a whole.

Literature: see Atonement, and Conversion. (A.T.O.)

Redintegration [Lat. *re* + *integratio*, from *integer*, whole]: not in use in Ger. and Fr.; Ital. *reintegrazione*. The reinstatement of a total presentation by a partial constituent of it.

Hamilton first introduced this term. He recognizes two fundamental laws of reproduction. The first is that of 'repetition,' which he states as follows: 'Thoughts coidentical in modification but differing in time tend to suggest each other.' The second is that of redintegration: 'Thoughts once coidentical in time are, however different as mental modes, again suggestive of each other, and that in the mutual order which they originally held.' He adds by way of explanation that unity of time involves a totality of thought, 'and that the partial thoughts included in the totality tend immediately to suggest each other as co-constituents of this former whole, and mediately that whole itself.'

When Hamilton says that the whole is only mediately reproduced because the parts are immediately reproduced, he seems to deprive the term redintegration of all distinctive meaning. It is not clear from this point of view that there is any advantage in substituting it for the more familiar 'association by contiguity.' On the other hand, there is a clear gain if the term be taken to denote the tendency of the part to reproduce the whole *as such*, including not merely the other partial constituents, but also their special mode of combination with itself and with each other.

The term redintegration is used by Shadworth Hodgson for associative reproduction in general. He does not, like Hamilton, recognize a distinct law of repetition.

Literature: Hamilton, Ed. of Reid, ii. Notes D**, D***; S. Hodgson, Met. of Exper. (Index, sub verbo). (G.F.S.)

Reductio ad absurdum [Lat. trans. of Aristotle's *ἀπαγωγὴ εἰς τὸ ἀδύνατον*]. The disproof of a proposition by showing that among its consequences there is one which is impossible or simply false.

This mode of proof is generally considered to be unsatisfactory, as not showing on what general principle the proposition disproved is false. But it is very easy to convert any such proof into a direct proof. Take, for example, the seventh proposition of the first book of Euclid, that on the same side of the base AB two triangles ABC and ABD cannot exist having $AC = AD$ and $BC = BD$. Euclid proves this by showing that if there were two such triangles it would follow that the angles BDC and BCD were equal and also that they were unequal. But precisely the same steps of reasoning show that if there are two triangles ABC and ABD on the same side of AB, and if $AC = AD$, then BC is unequal to BD, which shows that there are not two triangles having $AC = AD$ and $BC = BD$, since things unequal are not equal. (C.S.P.)

Reduction [Lat. *re* + *ducere*, to lead]: Ger. *Zurückführung*; Fr. *réduction*; Ital. *riduzione*. (1) The process of bringing an object from its given form into some standard form or state, for purposes of clearness, certainty, or use.

(2) In logic, the process of bringing a syllogism into the standard form of the first figure.

Thus a syllogism of the second figure, such as

No P is M
No S is P,
No S is M

may be reduced to the first figure by simply converting the first premise.

In dealing with the syllogism (*Anal. Prior.*, Bk. I), Aristotle regards the first figure as the complete or 'perfect' type of syllogism. The two other figures of syllogism recognized by Aristotle require, in order to make perfectly clear their actual force, the addition of immediate inferences from the premises, or other alteration of their structure, whereby they come to be stated in the first figure. These additions Aristotle states at some length. The devices for the reduction of the incomplete syllogisms, or of those of other figures, to the form of the first figure, were later developed in the textbooks of logic into a series of rules, kept in mind through mnemonic devices. Recent psychology has very generally tended to vivify these formal rules for reduction by efforts at new statements of the fundamental nature and of the true form of the syllogism. (J.B.)

Reduction has been recognized as necessary by Aristotle and almost all logicians; and before Kant it was generally recognized as proving that indirect syllogisms involved two or more steps of inference. But Kant from the same premises inferred that reasoning in the first figure is the only reasoning; and this extraordinary conclusion is reached by simply not calling immediate inferences reasoning, because they have not two premises. On that ground, nothing ought to be called reasoning except uniting two propositions into one copulative proposition. Cf. SYLLOGISM.

Reduction is either *ostensive* or *apagogical* (*per impossibile*). Ostensive reduction proceeds directly from the premises of the syllogism to be reduced to its conclusion, by means of conversions and a direct syllogism. Apagogical reduction proceeds indirectly by showing by direct syllogism that from the denial of the conclusion of the syllogism to be reduced and one of the premises the denial of the other premise would follow. Any syllogism of the second figure and any of the third except Darapti and Felapton (which are not valid if the universal be taken in the Philonian sense) can be apagogically reduced.

Ostensive reduction is either short or long. Short reduction involves the conversion of one proposition only; long reduction the conversion of two propositions, and, except in the fourth figure, the transposition of the premises.

In order to ascertain that which reduction is intended to ascertain, the nature of the different moods of syllogism, the first requisite is to recognize that we do not seek to trace out the process of reasoning; but what we seek to do is to analyse the precise logical conditions which render each mood valid. When this is recognized, it becomes easy to see and to generalize the relations expressed by the premises and note just at what point they cease to be cogent. For this purpose, appeal must be made to the logic of RELATIVES (q. v.). De Morgan has worked out the moods (*Cambr. Philos. Trans.*, x. 350). (C.S.P.)

Reduction-division: Ger. *Reduktionstheilung*; Fr. *division réductionnelle*; Ital. *divisione riduttiva*. The special form of CELL DIVISION (q. v.) which results in the formation of gonads (male or female elements).

As gonads have half the number of chromosomes found in the somatic cells of a given species, whenever gonads arise from cells there must be effected a reduction of the number of chromosomes. This reduction is completed during the final division of the cells, hence the term reduction-division. When the male or female nuclei fuse in the process of fertilization, the chromosomes are again brought up to their usual number. See SEX, CHROMOSOME, and FERTILIZATION.

Literature: HENNEGUY, La Cellule; E. B. WILSON, The Cell in Devel. and Inheritance; HERTWIG, Die Zelle. (C.S.M.)

Reduplication: see Recurrent Resemblance under RESEMBLANCE.

Reduplication (in biology): see SEGMENTATION.

Reflection [Lat. *reflectio*, from *re* + *flectere*, to bend]: Ger. *Reflexion*; Fr. *réflexion*; Ital. *riflessione*. (1) In popular language, any train of thought following a first impulse to believe or act, and reversing, modifying, or confirming it.

(2) Its technical meaning in psychology may be stated in the words of Locke: 'That notice which the mind takes of its own operations and the manner of them' (*Essay*, i. 78, § 4).

Reflection, in its psychological use, has a narrower application than 'self-consciousness,' and a wider than 'introspection.' All awareness of the self with its states comes under SELF-CONSCIOUSNESS (q. v.). But such awareness is not reflection unless interest and attention is predominantly directed to the self and its state. When I fail to hit a mark with a missile I become aware of myself as disappointed, and to that extent I am self-conscious. But I may not stay to think about my subjective state. On the contrary,

the main current of interest may still be directed to the mark and the means of hitting. I may at once pick up another stone and take aim again. In this case I do not reflect on my disappointment. I am merely aware of myself in an incidental way.

INTROSPECTION (q. v.), on the other hand, marks a more sustained interest in the self and its processes than reflection. It is reflection exercised with the view of obtaining accurate and systematic knowledge of mental operations.

The metaphor implied in the term reflection is that of 'turning back' upon something. It seems to indicate the indirect nature of the cognition of the self. In order to know ourselves we must first know something else. In order to have cognizance of the process of attending we must first attend, and this primary subjective process must have an object distinct from itself. Cf. REFLECTIVE.

Literature: see under SELF-CONSCIOUSNESS, and BIBLIOG. G, 2, *t*; also much of the literature of EPISTEMOLOGY. (G.F.S.–J.M.B.)

Reflection (in method): Ger. *Besinnung*; Fr. *réflexion*; Ital. *riflessione*. The conscious assimilation of knowledge; the counterpart of ABSORPTION or SELF-ESTRANGEMENT (q.v.), wherein the mind is absorbed in the novel, the strange, the wonderful. (C.DE G.)

Reflection (in physics). The change of direction which a ray of light, sound-wave, &c., undergoes when it strikes upon a surface and is thrown back into the same medium through which it approached the surface.

The fact of reflection is pressed into psychological service in optics, e.g. in Lambert's colour-mixer. See COLOUR MIXTURE. (E.B.T.)

Reflective (and **Unreflective**): Ger. *reflexiv*; Fr. *réflectif, réfléchi*; Ital. *riflessivo*. (1) Characterizing REFLECTION (q. v.); belonging to mental process or content which involves reflection, e.g. reflective consciousness, states, &c.

(2) Contrasted with 'unreflective,' 'spontaneous,' ORGANIC (q. v., in psychology), as indicated under the last-mentioned term, e.g. 'reflective' emotion. See MODESTY, SHYNESS, and SYMPATHY.

(3) Deliberate or thoughtful, as applied to an individual.

Unreflective is applied either to what is not reflective, in either of senses (1) and (2), or to what is undeliberate or ill considered.

Literature: see REFLECTION, and ORGANIC (in psychology). (J.M.B., G.F.S.)

Reflex (conscious): Ger. *bewusster Reflex*; Fr. *réflexe conscient*; Ital. *reflesso cosciente*. Action following regularly on the mere existence of the same conscious state. Cf. AFFECT.

Such action has the fixity and uniformity, and the immediate dependence on the present operation of a stimulus, which characterize the physiological reflex. See REFLEX ACTION, INSTINCT, and AUTOMATISM. (G.F.S.–J.M.B.)

Reflex Action: Ger. *Reflexbewegung*; Fr. *action réflexe*; Ital. (*atto*) *reflesso*. Kinesodic response to aesthesodic stimuli (cf. AESTHESODIC) of a regular kind without the intervention of volition or necessary participation of consciousness; or, more popularly, a non-voluntary reaction taking place in the body from stimulation to the brain or other nervous centre. (H.H.–J.M.B.)

A muscular contraction following directly upon an irritation of the skin affords a simple illustration, and the anatomical mechanism for such direct reflexes is illustrated in Figs. 1 and 2, SPINAL CORD. The response to the stimulus may be a muscular contraction, a secretion in a gland, a vascular change, or even a trophic or metabolic influence; but it must in each case be regarded as kinesodic or pertaining to the centrifugal system. The stimulus may be of a sort which, under other circumstances, would be appropriate to produce a sensation, or it may be of a character incompetent to appear in consciousness. It must be observed that while reflex action is not conscious action, one may be conscious of the act, and in many cases conscious changes precede, accompany, or occasion the reflex. The table given below sufficiently illustrates the diversity in nature and occasion.

Classification of reflexes (after Harris):

I. Periphero-motor.		
1. Excito-motor.	a.	excito-muscular.
	b.	excito-glandular.
	c.	excito-vascular.
	d.	excito-metabolic.
2. Algio-motor.	a.	algio-muscular.
	b.	algio-glandular.
	c.	algio-vascular.
	d.	algio-metabolic.
3. Sensori-motor.	a.	sensori-muscular.
	b.	sensori-glandular.
	c.	sensori-vascular.
	d.	sensori-metabolic.
II. Centro-motor.		
4. Emotio-motor.	a.	emotio-muscular.
	b.	emotio-glandular.
	c.	emotio-vascular.
	d.	emotio-metabolic.
5. Ideo-motor.	a.	ideo-muscular.
	b.	ideo-glandular.
	c.	ideo-vascular.
	d.	ideo-metabolic.

Excito-motor reflexes have for their cause some irritant, either mechanical or physiological. Hiccough is excito-muscular in the involuntary system, and the grinding of the teeth in children afflicted with worms in the voluntary system. The secretion of digestive fluids is excito-glandular. Excito-metabolic changes are more rare and less clearly reflex, such as the pigmentation of the skin in disease and pregnancy. Algio-motor or pain reflexes are illustrated by perspiration and lachrymation from pain. Sensori-motor reflexes are seen in the accommodation movements in sensory organs, winking from foreign bodies in the eye, &c., though often the transition to excito-motor is complete. Emotio-motor reflexes are the emotional 'expressions,' such as syncope from fear, sighing, cessation of salivation in fear, lactation from joy, blushing, and even metabolic changes like the whitening of the hair. The reflexes of the ideo-motor group are most difficult to construe, and it is probable that most of the phenomena so classified are really emotio-motor. Ideo-metabolic may be tropho-neuroses or 'stigmata'; but the blushing at a recollection, or salivation at the mental presentation of food, or weeping at an anticipation, differ in no way from the same acts when the occasion is directly presented with the associated emotion.

The most important reflex of all is commonly ignored, viz. that which provides for the constant readjustment of the parts of the system to each other, by virtue of which the entire mechanism is receptive even to minimal stimuli. This may be termed the neuro-equilibrium reflex. The 'tone' of the nervous system is this wonderfully complex adjustment of inhibition and stimulation. Every metabolic process in all the nerve-cells exerts its influence on the entire nervous tone, so that the nervous system is an instrument strung so tensely that its responses to outer irritations are far from being passive outcomes of the impacts.

One of the most remarkable reflex associations is that between vaso-motor alterations and the seat of emotions; though beyond the fact that the viscera and vessels are minutely connected with the sympathetic system, we know almost nothing of the physiological basis for this association. Cf. Emotion. (H.H.)

Among the most important general questions arising about reflexes are: (*a*) their mechanism in the centres (ganglia and lower cerebral); (*b*) their relation to the higher (conscious and voluntary) processes, by which they are normally inhibited and in a measure regulated; (*c*) their biological origin. For topics which bear upon these questions see Nervous System, Automatic Action, Secondary Automatic, Conscious Reflex, Living Matter, Voluntary Action, and Heredity.

Literature: see the textbooks of physiology and physiological psychology. (J.M.B.)

Reformation [Lat. *reformatio*]: Ger. *Reformation*; Fr. *Réformation*; Ital. *Riforma*. The great religious revolution of the 16th century which resulted in the origin and organization of Protestant Christianity.

For the distinctive principles of the Reformation see Protestantism. Historically, the three great branches of the Reformed Church are the Lutheran, Calvinistic, and Anglican. The disruption caused by the Reformation has given rise to the problem of the reunification of Christendom; the tendencies in that direction have of late been gaining strength.

Literature: see references under Protestantism; also Döllinger, Die Reformation, &c. (1846–8); Ranke, Deutsche Gesch. im Zeitalter d. Reform. (1869); d'Aubigné, Hist. of the Reformation (Eng. trans.); Burnet, Hist. of the Reformation of the Church of England. (A.T.O.)

Refraction (in physics) [Lat. *refringere*, to break up]: Ger. *Brechung*, *Refraction*; Fr. *réfraction*; Ital. *rifrazione*. The change of direction of rays of light, waves of sound, &c., which are obliquely incident to, and traverse a smooth surface bounding two heterogeneous media, or which traverse a medium of varying density.

The fact of refraction is illustrated, e. g., in the prismatic spectrum, different wave-lengths being differently refracted, and so giving the bands of colour. See Aberration (chromatic), and Diacoustics. (E.B.T.)

Refutation [Lat. *refutare*, to repel]: Ger. *Widerlegung*; Fr. *réfutation*; Ital. *confutazione*. Disproof by counter argument. Cf. Proof, and Reasoning. (J.M.B.)

Regeneration [Lat. *regeneratio*]: Ger. *Regeneration, Neubildung*; Fr. *régénération*; Ital. *rigenerazione*. (1) In theology: see Conversion (in theology).

(2) In biology: the process of new growth by which a lost part is replaced.

All organisms possess the power of regeneration, but it varies, generally speaking, inversely as the specialization or differentiation, being least in the highest animals, greatest in the lower animals and plants; in animals the

regenerative power is also greatest in simple tissues, less in the highly differentiated tissues, and at the minimum in the brain.

Many of the facts of regeneration have long been known, but of late years they have been widely discussed in relation to Weismann's theories. It has generally been regarded as a general and unexplained power of the organism to resume its integrity after the loss of a part. Weismann regards it as a specially developed adaptation to oft-recurring needs under the influence of natural selection. He seeks to prove that it occurs only in those parts of animals which are specially liable to loss; and contends that special germinal rudiments are developed to meet the oft-recurring need. On the other hand, it is held by certain of the experimental morphologists (e.g. Wilson) that cases of regeneration, such as the regeneration of the lens of the eye by injuries which would not happen in actual life, render this explanation inadequate.

Literature (to 2): A. Weismann, The Germ-Plasm (1892–3); and 'Regeneration' in Nat. Sci. (April, 1899; and the literature there referred to); E. B. Wilson, The Cell in Devel. and Inheritance; T. H. Morgan, Regeneration (1901). (C.Ll.M.–J.M.B.)

Regress: see Progress.

Regression [Lat. *regressus*, a going backward]: Ger. *Rückkehr*; Fr. *retour au type*; Ital. *regressione*. (1) In biology: the maintenance in a group of animals of a certain type or standard in any given character through the intermingling and levelling effects of heredity, whereby extreme variations are not perpetuated. It should be carefully distinguished from Reversion or Atavism (q. v.).

(2) In sociology: sometimes erroneously used for social retrogression and decay. See Social Evolution.

(1) The principle was first given general formulation by F. Galton. It is important as a conservative factor in evolution, since through it progress, being made by change in the average value of a character, becomes continuous and steady. Sports of all kinds have influence only as single individuals whose characters are balanced by other variations according to the law of distribution about a mean. The influence of a 'sport,' therefore, would be greatest the smaller the group in which he appears. Although operating upon individuals, the net result of natural selection appears in the shifting of the mean value.

The principle was embodied in Galton's law of the mid-parent (see Mid-), and assumes more exact form in the same author's 'law of ancestral inheritance,' known as Galton's Law (q. v.). It has been worked out mathematically on the basis of statistics illustrating Galton's law by K. Pearson, who establishes the relative stability of groups, and introduces a 'coefficient of stability.' Cf. Panmixia.

The principle seems, however, to apply mainly in cases of 'blended' inheritance (in which the characters of the two parents blend), and not in cases of 'mutually exclusive' inheritance (cf. Galton, *Nat. Inheritance*, 12, and Ewart, Pres. Address, Sect. Zool., Brit. Assoc., 1901).

(2) The principle has been discussed in connection with social evolution; but it evidently does not apply, since its operation is entirely through physical heredity (the mating of variations of different value). In social life a single individual mind, or a single thought, may dominate and colour all subsequent progress, its propagation being by imitation and tradition. Such propagation is inconsistent with the law of biological regression. If such an analogy held, it would indicate a law of regression (not of retrogression; cf. above, 2) in social evolution.

Literature: Galton, Natural Inheritance; and papers cited under Galton's Law, notably Proc. Roy. Soc. Lond., xi. 401; Pearson, ibid., meeting of Jan. 27, 1898; Science, Mar. 11, 1898, 337 f.; and Grammar of Science (2nd ed., 1900); Conn, Method of Evolution (1900); Headley, Problems of Evolution (1900); other expositions of Evolution (q. v.). On the social application see citations under Biological Analogy; also Kidd, Social Evolution; Ll. Morgan, Habit and Instinct; Baldwin, Social and Eth. Interpret., sect. 300 ff. (J.M.B., C.Ll.M., E.B.P.)

Regressive (in logic): see Progressive (2).

Regret: Ger. *Bedauern*; Fr. *regret*; Ital. *rammarico*. Emotion of sorrow attaching to portions of the past into which one's own voluntary attitudes or acts have entered. Cf. Remorse, and Repentance.

Regret attaches to things not done, to attitudes of *laisser-faire*, and even of indifference, as well as to positive acts. Some of the keenest regrets attach to opportunities unimproved, to attainments not won. 'Nothing but leaves! The spirit grieves O'er years of wasted life!' (J.M.B.)

Regular [Lat. *regula*, a rule]: Ger. *regel-*

mässig, regulär; Fr. *régulier*; Ital. *regolare*. Conforming to rule.

Regular proof: proof which has the external form considered appropriate to making its cogency clear. The form of a regular demonstration is as follows: first, the proposition to be stated is precisely stated in general terms; second, the construction of a diagram is described conforming to the conditions of the proposition; third, the proposition is restated with reference to the construction; fourth, by means of additions to the diagram, parts of it are brought into comparison; from which it is made evident that the proposition is true of that construction. It is evident that to perfect the proof, it ought then to be shown that what is true of the particular construction will be true in every case.

Regular syllogism: a syllogism which is stated precisely in the standard form, the major premise first, the minor premise next, the conclusion last; and with these propositions in the peculiar language, or symbols, of the system of formal logic used. (C.S.P.)

Regulative: see CONSTITUTION.

Reid, Thomas. (1710–96.) Born at Strachan, Scotland, he was educated at home and at Marischal College, Aberdeen. College librarian and student of mathematics and philosophy, 1726–37, when he became minister at New Machar in Aberdeenshire. Professor of philosophy in King's College, Aberdeen, 1752; of moral philosophy in Glasgow, 1763; resigned 1781, and devoted himself exclusively to philosophy until his death. He was the founder of NATURAL REALISM (q. v.) and its leading figure.

Reify (-fication) [Lat. *res*, thing, + *facere*, to make]: not in use in the other languages. To change a mental attitude or abstraction into a supposed real thing; to attribute objective substantiality to an idea. It is the practical equivalent to hypostatize; see HYPOSTASIS. (J.D.)

Reimarus, Hermann Samuel. (1694–1768.) Born at Hamburg and educated at Jena, he became Privat-docent in philosophy at Wittenberg; travelled in Holland and England; was professor of Hebrew in the Johanneum at Hamburg, 1728. He was one of the figures of the ENLIGHTENMENT (q. v.).

Reinhold, Carl Leonhard. (1758–1823.) Born at Vienna; fled from a Jesuit college, St. Barnabite order, 1783; professor in Jena, 1787–94; successor of Tetens as professor of philosophy in Kiel, 1823, where he died. He sought for the ultimate principle which would resolve the Kantian dualism of sense and understanding.

Reinhold, Ernst. (1793–1856.) Son of the preceding, he was born and educated in Jena, and became professor of logic, philosophy, and metaphysics in the university there.

Reintegration. Repeated INTEGRATION (q. v.). See also REDINTEGRATION. (J.M.B.)

Rejuvenation [Lat. *reiuvenare*, to make young]: Ger. *Verjüngung*; Fr. *rajeunissement*; Ital. *ringiovanimento*. The production of young tissue or cells of the embryonic type, capable of further growth and differentiation.

Embryonic cells are characterized by the small amount of their protoplasm, and the absence of differentiation in both the protoplasm and the nucleus. In the biological sense old cells are those which are most differentiated, and such old cells are never rendered young; hence rejuvenation in its popular meaning cannot be applied in biology. (C.S.M.)

Literature: MINOT, Senescence and Rejuvenation, J. of Physiol., xii. 97; and Biol. Centralbl., xv. 571; DELAGE, Structure du Protoplasma, and Année Biol. (successive issues); works on biology. (C.S.M.–J.M.B.)

Relation [Lat. *re* + *latus*, p. p. of *ferre*, to bear]: Ger. *Beziehung, Verbindung, Verknüpfung, Verhältniss*; Fr. *relation, rapport*; Ital. *relazione, rapporto*. See RELATION (consciousness of).

More specifically, (1) Practical. The bearing or influence of one thing upon another—the way one thing 'has to do' with another; for example, the testimony of *A* has relation to the guilt of *B*; the discovery of a new fact has relation to the truth of some theory.

(2) Logical. The mutual dependence of two or more subjects upon a common principle, fact, or truth, of such a kind that any assertion regarding one modifies the meaning of the other. Accordingly the predicate is true or false of one taken not independently or in isolation, but only in reference, regard, or respect to the other.

Examples: the relation of father and son, buyer and seller, of parasite and host. Many qualities may presumably be predicated of *A* which have no bearing upon what is asserted or believed of *B*, but in so far as *A* stands in relation to *B* (as father to son, seller to buyer, &c.), this indifference ceases, giving way to complete (logical) reciprocity. This does not mean that *A* and *B* are the common subjects of the same predicate, or are taken

conjunctively or collectively. On the contrary, they may be affected by quite different, even opposite, predicates; or the predicate of *A* may be clearly asserted, and that of *B* remain quite undetermined. It means only that every assertion regarding *A* carries with it some further assertion regarding *B*; and, conversely, that any assertion regarding *A* is possible only because of some qualification of *B*. Every predicate of either term both depends upon and influences the other. This is possible, however, only if there is some further predicate which is common to both *A* and *B*, and which affords the basis or foundation of the relation in which they further stand to each other—the relationship proper. This relationship is commonly also called the relation; and theories as to its nature bring us to the third type of meaning.

(3) Metaphysical. How can a belief or judgment regarding one fact affect the content of our judgment or belief of another disparate fact? What is the guarantee of the assumption of validity attaching to such a transfer? This is the question of the ontological or real worth of the logical use of the relation. The problem widens its significance tremendously when it is seen that all judgment and inference presuppose just such extension. It is not merely a matter of the possibility of judgment with reference to such obvious correlates as father and son; science rests on the postulate of some sort of relation between any given fact and some other fact—a relation which is the real, even if concealed, foundation of any scientific statement about either one taken separately. Thus the question of the truth conveying power of logical procedure is bound up with the question of the nature of relations. Various types of answer are afforded to the question.

(i) It is asserted that relations have no objective existence or counterpart. Relations are a purely mental product, stating something which emerges when facts having really nothing to do with one another are held before the same mental view, or are compared. This theory is of course the analogue of the older nominalism and conceptualism, the modern relation being the equivalent of the mediaeval universal. A relation is like a rhetorical simile. To compare a star and a tear institutes a relation between them *ad hoc* for the mind that compares; beyond that, nil. The same sort of thing (and no more) is true of a relation of cause and effect. Only sceptical philosophers have, however, carried the theory to this logical result. Most of the empiricists (who are characterized by their adherence to this view) assume without questioning that they have a right to the relation of resemblance; many fall back upon succession in time and coexistence in space, and (possibly) uniformity in the repetition of these successions and coexistences—an admission which the rationalists have seized upon to the undoing of this subjective notion of relations.

(ii) Another view, the popular survival of the realism of the middle ages, reinforced by pre-evolutionary zoology and botany, is that different things form natural classes, families, or kinds, and that it is in virtue of membership in the same sort or genus that things stand related to one another. The *εἶδος*, the form or species, is thus the ontological counterpart of the logical relation. As long as this view prevailed, the term relation was comparatively little used; universal doing service on the ontological side, and predication on the logical. With the growth of nominalism; with the scientific tendency to replace genera by laws; with the development of the view (3, i), making relations the products not the bases of classification, and classification a subjective instrument, another *fundamentum relationis* had to be found.

We have (iii) the tendency to view relation as equivalent with *law*. This is favoured by the common tendency to confuse law and force; the relation of gravitation, the law of gravitation, the force of gravitation, are to many minds practically synonymous. Or, if the matter be pressed somewhat further, it would probably be admitted that while the relation is a way of viewing things, and hence intellectual only, the related things are somehow 'connected' by a law which gives authority to the relation. It is clear, however, that this is a purely popular solution, evading the issue by circular reasoning.

(iv) Modern idealistic metaphysic has recognized with (3, i) that relations are connected with the process of judgment, but has attempted to invest relations with validity by regarding the world as the content of a single, permanent judgment, and hence made up of a system of relations. To try to follow the course of this argument would almost be to write the history of metaphysical logic since the time of Kant; but the following points may be briefly indicated. The notion

of a hierarchy of forms, genera, species, &c., is wholly given up; it is recognized that the problem is in reality that of the possibility of a valid judgment. All real judgment is synthetic—that is, involves the carrying over of a predicate of one subject to affect the predicate of another subject numerically distinct. Any other form of proposition is tautological, and hence no judgment at all. Judgment as such is therefore bound up essentially, and not merely by occasion, with the question of the reality of relations. This positive conclusion is reinforced by noting that the denial of reality to the relations instituted in judgment leads to complete scepticism, and destroys the whole fabric of science; and by noting that even the more thorough-going empiricists (or non-relationists) are obliged to assume the relation of resemblance or similarity in order to give mental viewing together, or comparison, any basis. Summarizing, we may say that, according to this theory, a relation is a permanent and necessary mode of judgment by which objects, and the world as *the* object, of knowledge are constituted.

(v) This view has to contend with three inherent difficulties:—

(*a*) In emphasizing relational knowledge, it appears to make discursive or reflective thought the type of all thought, and to have no place for intuitive consciousness or immediate identification of subject and object.

(*b*) It emphasizes the intellectualistic view of the universal, reducing feeling and will to forms of cognitive judgment.

(*c*) It presupposes qualities, or an unrelated manifold of some sort upon which the relating activity is exercised. Hegel accordingly gave relations a central position in the logic of reflective cognition, and consequently in the world of appearance and essence, but regarded this realm as intermediate between a sphere of immediate perceptive recognition and a region of rational intuition apprehending self-related wholes. Of Hegel it must be said that he never made clear just the connection between the self-related whole and the self-contradictory scheme of relations which it includes and supersedes. As Green (*Prolegomena to Ethics*) gives the most consistent modern rendering of Kant, so Bradley, in his *Appearance and Reality*, follows Hegel most successfully in pointing out the phenomenal character of any system of relations, and the necessity of a more immediate and harmonious whole in which relations as such cease.

(vi) There is a growing tendency to recur to the simple, practical statement of relation as the 'having to do' of one thing with another in the way of effecting some result in which one is interested, and to classify and generalize this point of view into a systematic philosophy. See PRAGMATIC. [This is especially due to the recognition of 'forceful' or dynamic, and genetic, relations. –J.M.B.]

According to both (iv) and (v), relations are reducible to the identity-in-difference function of judgment (the disagreement between them being as to the absolute or merely phenomenal significance of judgment), and are the various modes in which this function progressively manifests itself. According to the view now stated, they are reducible to different forms of the means-and-end function—that is, while they develop out of judgment, judgment itself is an attempt to state experience with reference to discovering valuable ends and appropriate means of realizing them. The 'relations' are thus objective definitions of the various influences which things have upon one another *practically*, that is, in the way of helping or hindering the attainment of aims, or in suggesting desirable modifications of these aims. The ultimate worth of this objective or intellectual statement of practical bearings is itself practical—that is, it facilitates the harmony and expansion of experience. By bringing to clear consciousness what the obstacles are, where they lie, and where favouring influences are found, it is itself an organic member of the practical process of setting up and effecting ends. The 'relation' is thus a statement of how to employ one part or phase of experience in regard to another.

It is a matter of method of action, not of structure of existence, physical or metaphysical.

Historical. As will be obvious from the preceding statements, the essential philosophical problem involved in the discussion of 'relation' is the connection between the logical process of knowledge (and knowledge is knowledge only in so far as it is logical) and the ontological order of reality. It thus occupies the same position in modern thought as was held by the mediaeval genus and species as the successor of the Platonic ἰδέα and the Aristotelian εἶδος. Locke was chiefly instrumental in effecting the transition. He defined knowledge as 'nothing but the perception of the connection of and agreement or

disagreement of and repugnance of our ideas' (*Essay*, Bk. IV. chap. i). Nominally, he does not define this agreement or disagreement as relation; but he expressly says that relation is one form of knowledge, and that of the three forms, two, viz. identity and coexistence, are only peculiar forms of relation. The fourth kind, 'knowledge of real existence,' brings us to such propositions as God is, and the existence of things. The former depends upon the relation of causation, and the latter upon some assurance or belief regarding the relation of immediate sensation to some object to which it corresponds, for practical purposes at least. Hence relation is, directly or indirectly, the central thing in knowledge. Berkeley only needed to make explicit this fact to make it evident that since one of the terms could not by any possibility be an idea, it was perfectly meaningless. Thus the problem of 'knowledge of real existence' became a problem of some valid sort of relationship between our 'ideas' or experiences, not of an 'idea' to something beyond all experience. Hume made explicit this problem, expressly sought for any relationship which could assure valid reference of the terms of experience to one another, and distinctly criticized all candidates that offered themselves. He showed that the worth, for cognitive purposes, of all relations came back to that of causality. He followed out the logic of Locke's statement that relation is the result of comparison, of a mental operation (Locke's *Essay*, Bk. II. chap. xxv. § 1), to prove that in itself every distinct idea is a *separate* existence, and to show that causality (or any relation) cannot affect reality itself, and hence must have a purely subjective origin—which he found in the power of imagination to glide easily from one idea to another frequently associated with it (see Bk. I, Part III, of *Treatise upon Human Nature*). It is well known how this scepticism 'awakened' Kant to a reconsideration of relations and their place in knowledge, and led him to redefine judgment as a necessary synthesis of sensations through concepts of the understanding, instead of as their casual association. The relations termed CATEGORIES (q. v.) by Kant and his successors are then the necessary, universal, and hence *a priori* (inherent in thought itself) functions of judgment in construing a world of experience (see the transcendental analytic in Kant's *Critique of Pure Reason*). The stone which Hume rejected became the corner-stone of modern epistemological idealism. Kant derived his table of twelve categories from a mere inventory of the forms of judgment recognized in formal logic. His successors took the idea of their being necessary modes of thought more seriously, and endeavoured to show how thought inevitably shows itself in such and such a system of relations. Fichte's *Wissenschaftslehre* and Hegel's *Logik* are the results. After Hegel's time the current divided into two streams: one the logical proper, attempting a more empirical and detached investigation of all the various relations or categories employed in judgment, e. g. number, quality, thing and attribute, &c., and the other the metaphysical, concerning itself with the objective validity of relation and hence of thought. (J.D.)

Relations considered as objective are variously classified. Some of the principal headings usually recognized are relations of Dependence (logical, see REASONING, and CONSEQUENT; causal, see CAUSE AND EFFECT); WHOLE AND PART (q. v., see also QUANTITY); QUALITY (q. v., see also CONTRAST, various topics); Temporal (see TIME); Special (see SPACE). Relations are also distinguished as 'dynamic' and 'static,' according as they do or do not involve process and change. For relation considered as CATEGORY see that term, and also PREDICAMENT. Cf. also RELATIVITY (different topics), and RELATIVE AND ABSOLUTE. (J.M.B.)

Literature: as will be inferred from this summary sketch, the discussion of relation is rather to be gathered in the whole drift of any modern writing upon metaphysics, than located in any one passage; but the following additional references may be of some value: HAMILTON, Lects. on Met., ii. 535–8; Discussions, 603–8; REID, on Intellectual Powers, Essay VI. chap. i; MILL, Logic, Bk. I. chap. ii. § 7, and chap. iii. §§ 10 and 11; LOTZE, Logic, § 337–8; Metaphysic, § 80–4; GREEN, Prolegomena to Ethics, Bk. I, and the whole course of his criticism of Locke, Berkeley, and Hume (Works, i); BRADLEY, Appearance and Reality, Bk. I, especially chap. iii; BOSANQUET, Knowledge and Reality. Discussion upon the psychology of relations is inadequate. The following may be noted: SPENCER, Princ. of Psychol., § 65; JAMES, Psychology, i. chap. ix (especially 243–71) and ii. 663–75; STOUT, Analytic Psychol., Bk. I. chap. iii; LOTZE, Metaphysic, Bk. III. chap. iii. The general tenor of the more recent discussion from the psychological

side is distinctly 'pragmatic' in its direction — to find the reality of relation in the inherent 'motor' tendency of any experience, and not in the structure of the sensation, in its casual associations, or in any separate 'relating' function. Cf. JAMES, Will to Believe, especially the Essay on The Sentiment of Rationality. (J.D.)

Relation (consciousness or apprehension of—which are better terms than 'sense,' or 'perception' of). When an attribute of an object *a* by its intrinsic nature also qualifies another object *b* in such wise that it cannot be conceived to exist apart from *b*, this attribute is said to be a relation between *a* and *b*; for consciousness of relation it is necessary not only that presented contents shall be related, but also that their relation shall itself be an object of consciousness.

The problem which is of chief interest to the psychologist is to assign the various grades of distinctness in which relations are apprehended. The mere union of parts in a total object does not involve consciousness of relation. The infant whose experience, according to James, is one 'buzzing, blooming confusion,' cannot be said to be aware of relations. With a single glance of the eye we may embrace in one field of view a vast variety of details. But we may have exceedingly little apprehension of interrelation of these details. To bring these relations to consciousness we must exercise analytic and synthetic attention. We must single out successively the separate constituents of the whole, and we must attend simultaneously to discriminated items, coupling them now in this way and now in that. Through processes of this kind consciousness of relation comes into being.

But the consciousness of relation thus attained need not involve a distinction between the relation as such and the things related. For this, comparison of relations is required and perhaps the use of language. We may be aware of *a* as distant from *b* without distinguishing the distance-relation as such from its particular presentation in this special case. It may merely form part of the presentation of this *a* and this *b* under these particular circumstances. If, however, we compare the distance between *a* and *b* with the distance between *c* and *d*, the concept of distance becomes disengaged from its special setting in particular instances, and appears as a distinct object of attention. Such relation-concepts become fixed and receive further development through the analytic-synthetic function of language. (G.F.S.)

Relative (and **Absolute**): Ger. *relativ*; Fr. *relatif*; Ital. *relativo*. For the foreign equivalents for ABSOLUTE see that term.

I. *Relative.* The term 'relative' may be applied either to words or to things.

A. A 'relative' word or term is one which can be used as a predicate, to signify that the subject has a certain kind of relation to some other subject, which is not expressly mentioned. A relative term is thus primarily to be distinguished: (*a*) from words expressing relations, which can only be used as copulas, where both subjects, between which they express a relation, are mentioned; (*b*) from qualitative predicates, which express the kind of entity which is related to some subject, but not the kind of relation which it has to it. But further, since the significance of a relative term is not exhausted by the relation which it expresses, but may also give information with regard to the nature of the subjects which it relates, it must also be distinguished from (*c*) words expressing a relation, which cannot be predicated of either subject singly, but only of both conjointly.

When a relative term can be applied to one subject, any term which can be applied to the other, to express the fact that it has to the first the converse relation to that expressed by the relative term applied to the first, is said to be *correlative* to the original relative term.

B. As applied to things, 'relative' is never merely synonymous with 'related'; it is always distinguished therefrom by implying that the relation or relations to which it refers are *essential* to the subject of which it is predicated, i.e. that this subject is one which can only be defined by some property such as might be expressed by a relative term.

To say that a thing is relative is, therefore, always to contradict yourself, since it implies that the relation of a whole to something else is also identical with or a part of that whole; and the fact that relativity is a self-contradictory notion is sometimes expressly recognized by those who use it, while, even where this is not expressly recognized, it seems to be the source of the depreciatory significance usually attached to the term. The only relation in virtue of which a thing might, without contradiction, be called relative is that of a whole to its part; since to

affirm or deny the whole is to affirm or deny the part: but, in fact, a whole seems never to be called relative in virtue of this relation, and the term relative seems generally to imply that the relation itself, and not merely, as in this case, that to which it is related, is identical with or a part of that which is said to be relative. Thus it is always a part which is said to be relative, not to a part of itself but to another part of the same whole or to that whole itself, in the sense that it has thereto, or to the relation between them, that analytic relation which really holds between a whole and its part; and to say this is always self-contradictory. A thing is, however, generally said to be relative to another thing only if it has certain kinds of relation to that thing; and the term, therefore, perhaps generally signifies confusedly that it has one or more of these, not only that they are constituents of its essence. Hence 'relative' may be said to denote, not only the self-contradictory proposition that a thing 'has no meaning apart from' some relation, or 'would not be what it is but for' its relations, but also that it has some one of the relations which may be classed under the two following heads:—

(1) That we can only describe or identify it by mentioning its relation to something else. This is not the case with *qualia* or unique instances of *qualia*, but only with particulars, of which there are several exactly alike. In these cases, to say that a thing is 'relative' implies that it differs from some other solely in respect of some relation, i.e. where it really differs from it only numerically this numerical difference is denied; and, in this sense, 'relative' almost always has a depreciatory significance, i.e. implies that the thing in question is unreal. The following are the chief relations which are thus used to identify particulars:—

(*a*) The relation of a position in time to the unique event by which its date is fixed. This relation may be either that of the position occupied by such event to the event, or those of distance before or after such position—a distance the length of which can again only be specified by reference to the number of certain events supposed to recur at equal distances. The same is true of positions in space at any one moment, but more commonly—

(*b*) Spatial positions are said to be relative, in virtue of the fact that we cannot identify positions at two different times, except by their relation to those occupied at both times by some other things, which are assumed either to occupy the same positions or to have moved continuously. Thus the relativity of motion and position signify, not merely, as with temporal position, that a position can only be identified by its relation to some unique thing, but that this unique thing itself will not serve to identify a position in every possible sense, since it must be assumed either to have been at rest or to have moved continuously, and we cannot tell either which has been the case or what has been the velocity of the movement, nor even that either has occurred.

(*c*) Exact similars occupying space and time may be said to be relative, in virtue of the fact that they can only be identified by reference to their occupation of positions which are relative either in sense (*a*) or in sense (*b*).

In view of the above facts, time and space as wholes are often said to be relative. This appears to be meant either (*a*) in the relative sense, dealt with below (2, *a*), namely, that they would be nothing apart from the things that occupy them, or (*β*) in the absolute sense, that they are composed of parts which are all relative and are therefore unreal; but it seems to be commonly implied that these parts are all relative to one another, and thus involve an infinite regress, through confusion of the position identified by its unique occupant with that occupant. Similarly matter may be said to be relative, because all its parts are relative to positions; and the same accusation may be extended to all that occupies space and time, because it is always composed of relative parts; which latter usage not only, like the others, involves neglect of the fact that the parts are relative not to one another, but to unique wholes, but also of the fact that these wholes are themselves occupants of space and time, and yet are not relative in any sense, since they can be identified without reference to their external relations.

(2) That a thing has some one of the following relations. These relations may belong to *qualia* or to unique instances of *qualia*; and hence when things are said to be relative in virtue of them, it is generally implied that the part of their essence which has the relation is distinguishable from the relation, but that it would not be so if it had not the relation. It is relations of this kind which are supposed to bind together the parts of so-called 'organic wholes,' which are defined as wholes of which the parts would not be what they are, but for

their relation to one another and to the whole: hence 'relative,' in this sense, may be used as a term of praise, implying that a thing involves the kind of contradiction necessary to constitute it a part of reality.

(*a*) All simple *qualia* may be said to be relative, in the sense that they must have the relation of difference to something else: a doctrine which is sometimes expressed by the formula 'No identity without difference.' It is thus supposed to be a contradiction that a thing should be and yet be different from nothing, on the ground that it is inconceivable; by which is meant the supposed psychological laws (*α*) that it is impossible to think of only one thing at a time, (*β*) that it is impossible to think that a thing should not be different from something else, (*γ*) that it is impossible to identify a thing, without thinking both of something different and that they are different. In a similar confused sense it may be said that all relations are inconceivable, on the ground that they cannot be conceived apart from some two things which they relate; and hence that they are relative. So, too, space and time may be said to be inconceivable apart from some occupant.

(*b*) Two things may be said to be relative to one another, if they are united by any of the following necessary relations, viz. mathematical and logical relations other than that of whole to part, the relation of a class-concept to a member of its class, and the relation of cause to effect. It must be noted (*α*) that, though a member of a class or particular instance of such is always said to be relative to its class-concept, the latter is not generally said to be relative to all the members or to any particular member, but only to *some* member; (*β*) that the causal relation in virtue of which relativity is most frequently asserted, is that of agent and reagent, in which two things, permanent through time, and necessarily coexistent, are said to be causes of one another.

(*c*) A thing may be said to be relative to another, which is not relative to it, if it is conceived to be related to it as attribute or accident to SUBSTANCE (q. v.), or as appearance to reality (see RELATIVITY OF KNOWLEDGE, and REAL). A substance would sometimes be said to be relative to all its attributes, or to *some* accidents or attributes, but never to any particular attribute or accident; but sometimes it is conceived as absolute.

II. *Absolute.* A. All terms except (1) relative terms, (2) terms which can only be used as copulas to express a relation, may be said to be absolute. Absolute is thus, with reference to relative, a negative term, denying that a term is of these two kinds.

B. Absolute may be used to deny that a thing is relative in any of the senses above defined. But the following are the commonest distinct uses:—

(1) It may be used of simple *qualia* to deny that their identity can be affected by the relations mentioned under I. B (2), as supposed to affect them.

(2) Absolute, as applied to position in space, seems not merely to be the contradictory of relativity, as defined in I. B (1, *a* and *b*), but to imply the possession of one or more properties, which would render the identification of positions by reference to their occupants unnecessary. The properties that may be thus implied are (*a*) that every position is numerically different from every other, (*b*) that each is qualitatively different from every other, (*c*) that a position may have a unique place in some qualitatively unique spatial series, in a sense in which this is impossible in Euclidean space, because such series are infinite. In this last sense absolute is also applied to magnitude, i. e. to signify a magnitude which should be the first or last in its series, and therefore need not be identified by reference to a unit, which in its turn is only identified by reference to something possessing the degree of magnitude intended. By 'absolute space and time' is not meant a space and time composed of absolute positions, but a space and time which, though relative in the senses given above, are either (*a*) not mere relations between the things that occupy them, or (*b*) not capable of accurate measurement by us, but such as geometry deals with.

(3) By an absolute existent is meant one whose existence does not depend upon that of any other, i. e. which is incapable of being produced or altered by any cause. But 'absolute' in this application seems generally to retain something of its etymological meaning = complete, i. e. what is logically incapable of being altered by addition, since it possesses every attribute of which it is capable. Hence, by those who hold that all relations argue incompleteness and dependence, 'the absolute' is used to denote that which is the whole of reality, and is incapable of alteration, because there is nothing external to it which could alter it.

History. The self-contradictory conception of things which could be defined by their relations, and even the recognition of this contradiction, date from the beginning of

philosophy; e. g. both are implied in the Platonic conception of *γιγνόμενα* and the Aristotelian of potential existence; but the name 'relativity,' as applied to this conception, together with its extremely wide application and the treatment of it as a fundamental principle, date only from the philosophy of Kant. Absolute, on the other hand, is connected with or used for the Aristotelian *ἐντελεχής*, which denotes what is complete and independent in the peculiar Aristotelian sense of what has no potentiality unrealized—whose form is completely actualized; and this conception, applied to God in the middle ages as the absolute or most perfect Being, and persisting till Kant in this application, is thus directly connected with the Hegelian term 'The Absolute.' Absolute and relative, as contradictories, first became objects of controversy at the beginning of modern philosophy, in connection with the new science of dynamics and as applied to motion and hence to space: thus Newton and Clarke maintained that space was absolute in the senses, (1) that each position was numerically different from every other, (2) that it was not a mere adjective of things, but might exist independently, and both these propositions were denied by Leibnitz. Kant's philosophy was greatly influenced by his study of these questions concerning the philosophy of mathematics; and he is perhaps responsible for the vogue of the word 'relativity,' by the cardinal position which he assigns to the nature of space and time in this respect. He does not, however, himself use the word as a principal term; and those two conceptions of his, which have had the widest influence in obtaining recognition for relativity, have only an indirect connection with the relativity of space. These are (1) his doctrine that the objects of experience are all constituted such, not by being given data between which relations hold, but by the fact that they are related in certain definite ways, and (2) his doctrine that these objects, therefore, form an infinite series, to regard which as real would be self-contradictory. Of the use of the word 'relativity' these doctrines seem to have been the origin, chiefly through Sir William Hamilton, who applies the word broadcast and with the most extreme vagueness, so that it is impossible to discover, in any particular case, whether it has any or all of the meanings detailed above; and this habit has been adopted, to a less degree, by influential writers such as Bain and Spencer. This use of the word has been no less encouraged by the writers strongly influenced by Hegel, who, though they do not use the word much, emphasize the conception even more; holding the doctrine that no relation is purely 'external,' i. e. fails to affect the essence of the things related, and that the more nearly it is external, the less real are the things it relates—a doctrine which they connect with the express contention that all the objects of experience are more or less self-contradictory.

See RELATIVITY OF KNOWLEDGE, and RELATION. (G.E.M.)

Relative (1) and (2) **Absolute Ethics.** A moral code or system of moral rules which (1) does or (2) does not vary with the different conditions of human life or at the different stages of its development. See ETHICS, and ETHICAL SYSTEMS.

The term absolute ethics was introduced by Spencer to signify the 'final permanent code' of conduct which describes the behaviour of fully evolved man in a fully evolved society. It implies, according to him, a condition in which the individual is perfectly adapted to his environment, and it excludes all cognizance of pain or of wrong. Absolute ethics is distinguished by Spencer (*Princ. of Eth.*, Part I, 'Data,' chap. xv) from relative ethics—the latter being regarded as an application of the former to a particular stage of development. The former might also be applied to such systems of ethics as regard moral laws as incapable of change or development—following eternally from the nature of God or of ultimate reality. To a system of this latter kind—called 'absolute' as opposed to 'relative' or 'conditional' morality—the title of Cudworth's treatise, 'eternal and immutable morality,' is commonly applied. (W.R.S.)

Relative Suggestion: not in use in the other languages. Associative reproduction so far as it is modified by the relatively new connections into which the revived presentations enter as parts of a train of thought. The term is used by Stout, *Analytic Psychol.*

The conception of associative reproduction as a REDINTEGRATION (q. v.) throws light on the meaning of relative suggestion. The term redintegration stands for the tendency of a presentation to reinstate the whole of which it has previously formed part. But in order to reconstitute the whole, not only the parts but their characteristic form of combination must be revived. If *a* is to reconstitute the whole *ab*, of which it has previously formed part, it is not enough for *a* to reproduce *b*; it must reproduce *b* in the same relation *r* to itself, as on the occasion of the original

experience. But the conditions operative at the time of reproduction may be such as to make unmodified reinstatement impossible. They may be such that if the parts are revived without alteration, their relation cannot be reinstated; or inversely, if the relation is reinstated, the related presentations must be modified. It may happen, and very commonly does happen, that the presentation which starts the reproductive process is not a mere repetition of the corresponding constituent of the original whole. It may vary considerably from this original constituent without losing its redintegrative tendency. Suppose the original combination to be *ab*, where *a* stands to *b* in a certain relation *r*. Suppose *a* to recur in the modified form *a*. Inasmuch as *a* partakes of the nature of *a*, it will tend as far as may be to reconstitute the whole *ab*. But the difference between *a* and *a* may be such as to require a corresponding differentiation of *b* if the relation *r* is to be reinstated. It may happen that *b* cannot assume the same relation to *a* as that in which it stood to *a*. Thus the revival of *b* will not be a reconstitution of the original whole, because the relation *r* has disappeared. On the other hand, if the relation *r* is recalled, the other term of the relation must be modified. For *b* there must be substituted *β*, which is related to *a* as *b* was related to *a*. This is relative suggestion.

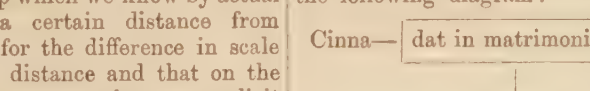
What actually takes place on any given occasion depends on the special conditions operative at the time. The more fully and intensely we are interested in the whole as such, the stronger will be the tendency to revive the relation *r* and to modify *b* so as to transform it into *β*. This tendency may take effect at once, so that *a* immediately calls up *β* without the previous intervention of other mental processes. Thus in the very act of making a pun or a rhyme we may alter the pronunciation of a word. If we are looking for a place on a map which we know by actual travelling to be a certain distance from London, we allow for the difference in scale between the actual distance and that on the map without express comparison or explicit formulation. The imitative plays of children are full of such mental accommodations, the doll, for instance, being treated as a baby *mutatis mutandis*.

In such cases relative suggestion operates or may operate immediately, in others it does not take effect without an intervening mental operation involving express comparison between the present case and its analogue. When this happens the process is one of reasoning in the proper sense. Suppose we have to throw a piece of paper upwards for a considerable distance. We are used to throwing stones as far or further; but a piece of paper is different. If the problem presented itself for the first time, it is very unlikely that any one but a genius would proceed immediately to wrap the paper round a pebble and then throw. There would be a previous comparison of the case of throwing a stone and throwing a piece of paper, and the relative suggestion would be brought to birth by the help of this preliminary process.

It will be seen that relative suggestion depends on the interest which a certain kind of relation or form of combination possesses. It would be possible to classify different types of mind from this point of view. In some minds rhetorical antithesis, in others metaphor, in others syllogistic form, in others a triple dialectic movement preponderates and determines relative suggestion. (G.F.S.)

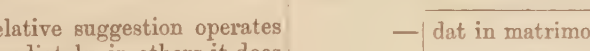
Relatives (logic of): Ger. *logische Beziehungslehre*; Fr. *logique des relations* (L.C.); Ital. *termini relativi* (relative terms). If from any proposition having more than one subject (used to include 'objects') we strike out the indices of the subjects, as in '—— praises —— to ——,' '—— dat in matrimonium ——,' what remains and requires at least two insertions of subject-nouns to make a proposition is a 'relative term,' or '*relative rhema*,' called briefly a 'relative.' The relative may be converted into a complete assertion by filling up the blanks with proper names or abstract nouns; this serves as a criterion.

But in such a relative there must be such an idea of the difference between the subjects to be applied that 'dat in matrimonium' shall be different from 'datur in matrimonium.' In order to free ourselves from the accidents of speech, we might represent the sentence by the following diagram:



or, as follows:

d_{ijk} (Cinna $= i$, Cossutia $= j$, Caesar $= k$). Then the relative will appear as



or as d_{ijk}.

But in either case, in order to explain what

is meant, it will be necessary to explain how those three tails, or the three letters *i*, *j*, *k*, differ. The order shows which of three indices is given, which giver, which recipient.

Relatives may be more or less general like other terms, that is, one relative may be predicable of members of a set of which another is not, while the latter is predicable only of members of sets of which the former is predicable. By a set is meant an ordered system, so that *ABC* and *BCA*, though the same collection, are different sets. As any general term is predicable of any one of an aggregate of individuals, so a relative is predicable of any one of an aggregate of sets; and each such set may be regarded as an individual relative. By a system is meant an individual of which if anything is true, the truth of it consists in certain things being true of certain other individuals, called its *members*, regardless of the system. A *system* is either a *sorite*, *heap*, or *mere collection*, or it is a *set*. A *sorite* is a system of which, if anything is true, its truth connsists of the truth of one predicate for any one of the members. A *set* is a system of which the truth of anything consists in the truth of different predicates. Of course the idea of relation is involved in the idea of a system. As it is very important for the understanding of relations that the conception of a system should be perfectly clear, let us consider the latter a moment in its simplest form, that of a *sorite* or mere collection. *ABC* is a sorite. Thus, it is true of it that it contains the three first letters of the alphabet, and the truth of that consists in *A*, *B*, and *C* being each one of the first three letters of the alphabet. It is true that it contains nothing but the first letters of the alphabet, because it is true of *A*, *B*, *C* severally that each is nothing but one of the first three letters of the alphabet. *AB* is a different sorite, because something is true of it which is not true of *ABC*. *A* may be regarded as a sorite provided we mean not *A* in its first intention and being, but a something whose being consists in *A*'s being. The collection *A* is not the letter *A*, but it contains *A* and nothing else. If it be said that there is no such thing, the reply is that every collection, every system may be said to be an *ens rationis*. To this point we shall return. Even Nothing may be said to be a collection. For when we say that Nothing is less than 1, we do not mean that a self-subsisting individual is so, but that an *ens rationis* whose mode of being consists in the absence of everything is less than 1. The sorite *ABC* is other than *ABΓ*. But should I say that *ABC* contains two of the letters of Caesar's first name, and subsequently learn that that was a mistake, the real name being Gaius, that would not make *ABC* a different sorite.

That in the reality which corresponds to a proposition with a relative predicate is called the *fundamentum relationis*. A *relationship* is a system of such fundamenta. *Relation* is the relative character, conceived as belonging in different ways to the different relates, and (owing to the somewhat undue prominence given by familiar languages to one of these) especially to the relate which is denoted by the noun which is the subject nominative.

Relatives and relations are said to differ in their *orders*, according to the numbers of their relates. *Dyadic* or *dual* relations, or relatives of two relates, of which the second is called the *correlate*, differ somewhat widely from *plural*, or *polyadic*, relations. *Triadic* relations have all the principal characters of *tetradic* and higher relations. In fact, a compound of two triadic relatives may be a tetradic relative; as 'praiser of —— to a maligner of —— to ——.'

Relatives may be compounded in all the ways in which other terms can be compounded as well as in other ways closely related to those. Thus, *A* may be said to be at once a lover and a servant of *B*, and it may be said that there is something, *X*, such that *A* is a lover of *X*, while *X* is a servant of *B*; so that *A* is a lover of a servant of *B*. This mode of composition is called *relative multiplication*. So, not only may it be said that *A* is either a lover or a servant of *B* (not excluding both), but also that whatever *X* may be, either *A* is a lover of *X* or *X* is a servant of *B*; that is, *A* is a lover of everything there is besides servants of *B*. (This wording, by Schröder, slightly violates English idiom, but is valuable as showing the analogy to aggregation.) This mode of composition is called *relative addition*. So, again, it may not only be said that *A* is if a lover then a servant of *B*, but also that whatever *X* may be, if *A* is a lover of *X*, then *X* is a servant of *B*; that is, *A* is a lover only of servants of *B*. This is called *relative regressive involution*. Or it may be said that whatever *X* may be, *A* is a lover of *X*, if *X* is a servant of *B*, or *A* is a lover of whatever is a servant of *B*. This

is called *relative progressive involution*. Polyadic relatives are capable of other modes of composition. Thus, it may be said that anything whatever, X, being taken, something Y exists, such that A praises X to Y while X maligns Y to B; that is, A praises everybody to somebody maligned by him to B. Or we can say that there is something Y, such that, whatever X may be, A praises X to Y while X maligns Y to B; or, A praises everybody to somebody whom everybody maligns to B.

Deductive logic can really not be understood without the study of the logic of relatives, which corrects innumerable serious errors into which not merely logicians, but people who never opened a logic-book, fall from confining their attention to non-relative logic. One such error is that demonstrative reasoning is something altogether unlike observation. But the intricate forms of inference of relative logic call for such studied scrutiny of the representations of the facts, which representations are of an *iconic* kind, in that they represent relations in the fact by analogous relations in the representation, that we cannot fail to remark that it is by *observation* of diagrams that the reasoning proceeds in such cases. We successively simplify them and are always able to remark that such observation is required, and that it is even thus, and no otherwise, that the conclusion of a simple syllogism is seen to follow from its premises. Again, non-relative logic has given logicians the idea that deductive inference was a following out of a rigid rule, so that machines have been constructed to draw conclusions. But this conception is not borne out by relative logic. People commonly talk of *the* conclusion from a pair of premises, as if there were but one inference to be drawn. But relative logic shows that from any proposition whatever, without a second, an endless series of necessary consequences can be deduced; and it very frequently happens that a number of distinct lines of inference may be taken, none leading into another. That this must be the case is indeed evident without going into the logic of relatives, from the vast multitude of theorems deducible from the few incomplex premises of the theory of numbers. But ordinary logic has nothing but a barren sorites to explain how this can be. Since Kant, especially, it has been customary to say that deduction only elicits what was implicitly thought in the premises; and the famous distinction of analytical and synthetical judgments is based upon that notion. But the logic of relatives shows that this is not the case in any other sense than one which reduces it to an empty form of words. Matter entirely foreign to the premises may appear in the conclusion. Moreover, so far is it from being true, as Kant would have it, that all reasoning is reasoning in *Barbara*, that that inference itself is discovered by the microscope of relatives to be resolvable into more than half a dozen distinct steps. In minor points the doctrines of ordinary logic are so constantly modified or reversed that it is no exaggeration to say that deductive logic is completely metamorphosed by the study of relatives.

One branch of deductive logic, of which from the nature of things ordinary logic could give no satisfactory account, relates to the vitally important matter of abstraction. Indeed, the student of ordinary logic naturally regards abstraction, or the passage from 'the rose smells sweet' to 'the rose has perfume,' to be a quasi-grammatical matter, calling for little or no notice from the logician. The fact is, however, that almost every great step in mathematical reasoning derives its importance from the fact that it involves an abstraction. For by means of abstraction the transitory elements of thought, the *ἔπεα πτερόεντα*, are made substantive elements, as James terms them, *ἔπεα ἀπτερόεντα*. It thus becomes possible to study their relations and to apply to these relations discoveries already made respecting analogous relations. In this way, for example, operations become themselves the subjects of operations.

To take a most elementary example—from the idea of a particle moving, we pass to the idea of a particle describing a line. This line is then thought as moving, and so as generating a surface; and so the relations of surfaces become the subject of thought. An abstraction is an *ens rationis* whose being consists in the truth of an ordinary predication. A *collection*, or *system*, is an abstraction or abstract *ens*; and thus the whole doctrine of number is founded on the operation of abstraction. If we conceive an object to be a collective whole, but to be so in such a way that it has no part which is not itself a collective whole in the same way, then, if the collection is of the nature of a sorite, it is a *general*, whose parts are distinguished merely as having additional characters; but if the collection is a *set*, whose members have other relations to one another, it is a *continuum*.

The logic of continua is the most important branch of the logic of relatives, and mathematics, especially geometrical topic, or topical geometry, has its development retarded from the lack of a developed logic of continua.

Literature: relatives have, since Aristotle, been a recognized topic of logic. The first germ of the modern doctrine appears in a somewhat trivial remark of ROBERT LESLIE ELLIS. DE MORGAN did the first systematic work in his fourth memoir on the syllogism in 1860 (Cambridge Philos. Trans., x. 231–358); he here sketched out the theory of dyadic relations. C. S. PEIRCE, in 1870, extended Boole's algebra so as to apply to them, and after many attempts produced a good general algebra of logic, together with another algebra specially adapted to dyadic relations (Studies in Logic, by members of the Johns Hopkins University, 1883, Note B, 187–203). SCHRÖDER developed the last in a systematic manner (which brought out its glaring defect of involving hundreds of merely formal theorems without any significance, and some of them quite difficult) in the third volume of his Exakte Logik (1895). SCHRÖDER'S work contains much else of great value. PEIRCE has published only three papers since 1883, one of which appeared in the Amer. J. of Math., vii. (1885) 180–202, and the other two in the Monist, vii. (1896–7) 19–40, 161–217. An important work in which relations are treated graphically is A. B. KEMPE'S Theory of Mathematical Form, published in the Philos. Trans. for 1890. Other workers are JOSEPH JOHN MURPHY, ALEXANDER MACFARLANE, GIUSEPPE PEANO. GEORG CANTOR, RICHARD DEDEKIND, and others have treated relations of quantity, and their writings—especially DEDEKIND'S book, Essays on the Theory of Number (Eng. trans., 1901)—are particularly recommended to students of philosophy. Translations of parts of some of CANTOR'S memoirs into most puzzling French are given in the Acta Mathematica, ii; the Math. Annalen (xlvi and xlix) contain others of great importance; and CANTOR especially addresses students of philosophy in his Zur Lehre vom Transfiniten Erste Abth., (1890). This brochure consists of papers originally printed in the Zeitsch. f. Philos. u. philos. Krit. See also V. B. RUSSELL, Sur la logique des relations, in Revue de Mathématiques, vii (1901); WHITEHEAD, in recent numbers of the Amer. J. of Math. (C.S.P.)

Relativity: Ger. *Relativität*; Fr. *relativité*; Ital. *relatività*. That element in the determination of a thing or object which arises from its RELATION (q.v.) to other things or objects. See the following topics. (J.M.B.)

Relativity (affective). The liability of affective states to modification by other affective states.

Applied (1) to pleasure and pain, which are said to be relative to each other; an extreme form, holding that pleasure is only absence of pain (cf. the literature of PAIN AND PLEASURE, the 'relativity theory'); (2) to emotions, considered as liable to modification from one another. See CONTRAST (affective). (J.M.B.)

Relativity (in psychology, law of): Ger. *Beziehungsgesetz, Gesetz der Relativität*; Fr. *loi de relativité*; Ital. *legge di relazione* (or *relatività*). (1) The law that every phase of experience is influenced by every other phase of the experience of the moment, and also by the whole past history of consciousness.

It is employed by Wundt to explain Weber's law, certain geometrical optical illusions, visual contrast, temperature adaptation, &c. Experimental psychology has, however, in general preferred to look to physiology for the conditions of such mental facts or laws (Wundt, *Physiol. Psychol.*, 4th ed., i. 393, 397, 416, 591; *Human and Animal Psychol.*, 62, 119, 264). In Wundt's *Grundriss* (1896) the law of relativity assumes a threefold form: the law of psychical resultants, the law of relations, and the law of psychical contrasts. This theory is known as that of the 'relativity of sense qualities.' Cf. CONTRAST (various topics). (E.B.T.)

(2) The theory defined under RELATIVITY OF KNOWLEDGE (2).

Relativity of Knowledge: Ger. (1) *Relativismus*, (2) *Relativität der Erkenntniss*; Fr. *relativité de la connaissance*; Ital. *relatività della conoscenza*. (1) This term seems most properly to denote the theory that all human knowledge is relative to the human mind, in the sense that we can only know, of things, the effects which they produce upon our minds, and not what they themselves are like. Cf. EPISTEMOLOGY.

The theory is thus, as it stands, doubly self-contradictory, since it combines the proposition (*a*) that each of us can know nothing but what is in his own mind, whence it follows that he cannot know that anything but his own mind exists; with the propositions (*b*) that we do know that what is in our minds is an effect of other things; and (*c*) that this is true of *us*, i.e. that more than one

human mind does exist. Moreover, proposition (*a*) seems to be intended to assert that we do know the states of our own minds absolutely, i.e. that all the knowledge, which on this theory we can have, is absolute; and hence, on pain of a further contradiction, it would seem that the relativity of all our knowledge must be understood to mean merely that it is limited to a certain class of objects. That relativity should be understood in this sense does not, however, seem to be the intention of those who hold the theory; if it were so, the inclusion in its definition of proposition (*b*) would be a perfectly evident contradiction. Their meaning seems rather to be that, knowledge being a mere effect produced in our minds by the things which are known, we cannot tell whether it resembles them or not; and hence that, since knowledge of a thing is always knowledge not of it, but of its effect on us, all our knowledge may be not knowledge, but false belief. They seem merely to have overlooked the fact that this theory is openly self-contradictory; and that, if it were true that doubt must be cast on our knowledge of things, on the ground that it is a mere effect, the same doubt must also consistently be cast on our knowledge of these effects, i.e. on our knowledge of what is in our minds. Such inconsistencies must follow from their fundamental false assumption that to be known is to produce an effect upon the mind, i.e. that the relation of knower to known is a causal relation; for it immediately follows from this that we never do know what we know, but always something else, which is to be regarded as a result of the interaction with our minds of the object we alter by knowing it.

(2) The term has also been used to denote a psychological theory that we can never have knowledge of one thing only, but that whenever we are conscious of one thing we must also simultaneously be conscious of another different from and hence related to the first [see Hobbes, *Elem. Philos.*, iv. 25, 5; Bain, *Ment. and Mor. Sci.* (1868), 83; Ward, *Encyc. Brit.*, art. 'Psychology'; Höffding, *Outlines of Psychol.* It is criticized in Baldwin, *Handb. of Psychol.*, i.—E.B.T.]. Cf. RELATIVITY.

The term is now commonly applied to the theory of Protagoras, expressed in the famous saying, *πάντων χρημάτων μέτρον ἄνθρωπος*, 'man is the measure of all things.' This theory seems to have been based on the obvious fact that the same object may appear different to different men at the same time, or to the same man at different times. It is from this fact that Protagoras appears to have drawn the contradictory conclusion that all our beliefs may be not partially, but wholly untrue, as is implied in his stating his theory with regard to all things. Both he and the Sceptics, who held a similar theory later, seem to have differed from modern relativists, chiefly in emphasizing the fact that some beliefs were false owing to changes in our minds, as their reason for holding that all might be false, and in not insisting that any of our beliefs were knowledge—a contradiction which they nevertheless implied. In modern philosophy definition (1) will apply to the theory of Kant, to which accordingly Mill applies the term, although neither Kant himself nor most others commonly so apply it. Kant held not only that all our knowledge is due to the interaction of our minds with external objects, but also that we can definitely trace what elements in it are due to each source. It was from him that Hamilton largely derived the theory to which he gave this name; a theory which seems capable of being brought under our definition, in spite of Mill's opinion to the contrary, if we understand him to have used 'object' in the same twofold sense as Kant, to denote (1) the thing-in-itself, (2) the object extended in space, which, though still relative to our minds, he holds to be an object whose qualities are directly perceived, whereas the secondary qualities are not intrinsic qualities of any object. Mill himself seems to hold that the above is the proper definition of the doctrine; but he fails to distinguish the importance of the question whether proposition (*b*) is or is not to be regarded as forming part of the definition along with (*a*) and (*c*), and accordingly he himself seems inclined to hold (*a*) and (*c*) alone, while still professing himself a believer in the relativity of knowledge, which he has defined as including (*b*). Bain uses the term to denote the psychological theory. Spencer upholds the 'relativity of knowledge' in a very vague and wide sense, seeming to identify Hamilton's doctrine, first, with the psychological theory (2), combined with a proposition contradictory of it, that we can only know relations and not the things related; and second, with the theory that everything we can know has some kind of relation to everything else. In similar vague senses the term may be applied to so many theories that details are unnecessary.

Literature: SIR W. HAMILTON, Discussions

on Philos. and Lit.; J. S. Mill, Exam. of Hamilton; H. Spencer, First Princ.; A. Bain, Logic. See Eisler, Wörterb. d. philos. Begriffe, 'Relativismus,' 'Relativität.' (G.E.M.)

Religion [Lat. *religio*, from *religare*, to bind]: Ger. *Religion*; Fr. *religion*; Ital. *religione*. Subjectively, the experience which arises out of man's conscious relation to some transcendent agent or agents, upon whose attitude towards him his welfare is believed in some measure to depend; objectively, the body of beliefs and practices which arise in connection with this experience, and which are ordinarily associated with some form of institutional life.

The above is a definition of the concrete experience of religion rather than a theory of it. Among the important questions that arise concerning religions are those of origin, development, and classification, the problems arising out of the comparative study of religions, and the philosophical question as to the ultimate nature and grounds of religion. This last-named question belongs to the philosophy of Religion (q.v.). The question of the origin of religion has its psychological aspect, in which the point in debate is whether religion is to be regarded as a superinduction or as being internally rooted in our nature (see Religion, psychology of); while objectively the issue arises between supernaturalism and naturalism, the latter presenting such forms as the dream theory of Herbert Spencer, the ghost theory of Tylor, or the view of Max Müller to the effect that religion has its origin in our sense of the indefinite. On the question of the development of religion there is (1) the problem as to the priority as between polytheistic forms of religion and monotheism, or, more strictly speaking, henotheism; (2) that of the place of fetichism, whether it is to be regarded with Tiele as a form of primitive animism, or, with Müller and Spencer, as a later and degraded form of religious belief. A fundamental distinction in the sphere of classification is that between the naturalistic and the ethical, the latter including all the higher and more spiritual forms. Certain of these problems are treated under the topics immediately following.

Literature: A. Réville, Prolégomènes de l'Hist. des Religions (Paris, 1881); Tiele, Outlines of the Hist. of Religion (London, 1877); Pfleiderer, Die Religion, ihr Wesen u. ihre Gesch. (Berlin, 1869); H. Spencer, Princ. of Sociol., i; Max Müller, Origin and Growth of Religion (1878); Martineau, A Study of Religion (Oxford and N. Y., 1888); S. Kellogg, The Genesis and Growth of Religion (N. Y., 1892). Cf. the other topics Religion. (A.T.O.)

Religion (evolution of). (1) The historical stages of religion objectively considered in its relation to all other factors of human evolution and in all its embodiments and manifestations. (2) The science which treats of (1). (J.M.B.)

In the present state of knowledge, it is by no means easy to speak either with definiteness or decision on this subject. Several reasons may be assigned. (1) There can be no competent treatment of evolution of religion apart from a science of religions; and this science has come into being only within the last fifty years. (2) The history of religions has made such enormous progress within living memory that the materials garnered have not been mastered fully as yet. (3) The fundamental principles, rational and natural, to which evolution must be traced, were not recognized as present in all religions till within comparatively recent times. Vico (1725), Voltaire (1756), and Lessing, in the well-known tractate on the *Education of the Human Race* (1780), adumbrated the modern standpoint. Nevertheless, till this time—and till a much later date among the English-speaking peoples (see *Bridgewater Treatises*)—natural theology, with certain crass metaphysical implications, everywhere held the field, making an application of the historical, comparative, and genetic methods out of the question. Herder (1784) first formulated specifically something like the evolution problem; but it was reserved for Hegel (1829) to give the requisite vitality to the new conception of the unity of religions—to recognize religion in them all. Indeed, systematic treatment of the entire subject-matter, undertaken with complete consciousness of aim, was possible only so late as 1860, and did not make marked progress, nor attract general attention, for another decade. (4) Evolution, too, is a comparatively new discovery; for although it was held by men of culture as early as the middle of the 18th century, and by philosophers early in the 19th, its main exploitation belongs to the biologists after the middle of the latter. Naturally, then, many problems still remain to be elucidated ere one can declare precisely how a theory of the transformation of organisms can be transferred, with sufficient justification, to material so widely different as religion. It may be

well to remark, in passing, that notable success in the accumulation of mere facts has served to obscure this point hitherto, and to an unfortunate degree. As in biology, so here, discussion of certain aspects of the means whereby evolution takes place has often been mistaken for a controversy over evolution itself—a totally different thing.

The principal difficulty in applying evolution to religion must be traced to the facts that evolution is a complex conception, and that we are as yet far from being masters of the various implied elements. What are they? The application of evolution to religion implies (1) the assembling or collection of all accessible data regarding religions; that is, it cannot be accomplished without a competent history of religions. (2) When the data have been thus procured, it is necessary to treat them scientifically. They must be grouped; and here the methods of comparison, with their ancillaries of likeness and difference, have to be employed. On this basis alone can inductions be made with safety. In other words, application of evolution to religion requires a science of religions. (3) Finally, on the basis of the results obtained from this history and science, deduction becomes possible, and then the sphere of philosophy of religion is entered upon. Here, too, the problem of evolution assumes its acutest form. But it is highly undesirable, as past efforts show, even if it were feasible, to separate history and science of religions from philosophy of religion in dealing with this subject. For the most important aspects of the problem demand continuously the presence of all these disciplines, especially of the science and the philosophy. This becomes evident when it is remembered that the conception of evolution contains two co-operating ideas, neither of which can be torn from the other. These are the ideas of change and of permanence. Taking the changes incident to an evolution of religion, we at once encounter problems which, though trenching upon philosophy, belong conspicuously to the sphere of science of religions. For example: What are the species of religions; that is, what stages can be traced in the evolving series? Seeing that all religion is teleological, are any marked differences of aim to be found as between the various species? What are the laws of the evolution; or, do beginnings, growth, maturity, and decay, in the various stages, follow similar or identical courses? How do the stages pass over into one another? In dealing with such questions, the element of change predominates. When the element of permanence attracts attention, philosophy of religion comes to our aid. For such philosophical questions as the following must be asked. What is religion? What is the origin of religion? What are the psychological factors in religion? What is the differentiating factor or factors in human experience that make man a religious being, as no other being is religious? What is God?

It is necessary to remember that, philosophically speaking, evolution does not necessarily imply progress. The problem is to disengage a permanent element, common to all the changes, by the presence of which these changes, no matter what their differences, can be called *religious*. The permanent is to be deduced from the passing, the constitutive from the contingent. When this has been accomplished, it may be possible to display an evolution, in the sense that rational (that is, explanatory or self-explanatory) factors pertain to every stage. Then the special or distinctive task of philosophy begins to set forth an evolution, *not as a time series*, but as a gradual expansion in adequacy of explanation from type to type. Religion evolves in the sense that, as it becomes more and more sufficient to the conceptions of deity, of the universe as God's cosmos, and of the measure of perfect manhood, it also becomes more adequate to itself—that is, shows forth its own nature in progressively clarified shapes. Thus, at last, it becomes possible to interpret all religions in the light of religion (which is the highest religion), and to elucidate the constituent factors necessarily present in this last.

Numerous efforts towards this end have been made during the past eighty years. But we cannot anticipate an immediate or easy solution of the problems involved. This mainly because philosophy of religion is not yet a century old, while history and science of religions have been pursued for but two generations. Cf. the other topics RELIGION.

Literature: this is very large, and may be found at length in DE LA SAUSSAYE, Lehrb. d. Religionsgesch. In the list which follows, the Hibbert and Gifford Lectures more important for the present subject are italicized. Hibbert Lectures (*Max Müller, Renouf, Renan, Rhys Davids, Kuenen*, Beard, *Réville, Pfleiderer*, Rhys, *Sayce*, Hatch, *d'Alviella, Montefiore*, Upton, Drummond); Gifford

Lectures (*Max Müller*, Wallace, J. Caird, *Bruce*, Stirling, *Pfleiderer*, Fraser, *Tiele*, *E. Caird*, *A. Lang*, *L. Campbell*, Ward, *Tylor*, Royce); D'ALVIELLA, Contemporary Evolution of Religious Thought; E. v. HARTMANN, Das religiöse Bewusstsein d. Menschheit; JEVONS, Introd. to the Hist. of Religion; RÉVILLE, Prolegomena to the Hist. of Religions (Eng. trans.); Les Religions des Peuples non-civilisés; RENOUVIER, Introd. à la Philos. analytique de l'Histoire; MAX MÜLLER, Introd. to the Sci. of Religion; TIELE, Outline of Hist. of Ancient Religions (Eng. trans.); HAPPEL, Das Christenthum u. d. heutige vergleichende Religionsgesch.; Die Anlage d. Menschen z. Religion; RAUWENHOFF, Wijsbegeerte v. d. Godsdienst; SCHULTZE, Der Fetischismus; TIELE, art. Religions, in Encyc. Brit.; and many arts. in the Rev. de l'Hist. des Religions; Theologische Tijdschrift; Annales du Musée Guimet; Wiener Zeitsch. f. d. Kunde d. Morgenlandes; Zeitsch. d. Deutschen Morgenländischen Gesell. (R.M.W.)

Religion (philosophy of): Ger. *Religionsphilosophie*; Fr. *philosophie de la religion*; Ital. *filosofia della religione*. The subject must be distinguished (see below) on the one hand from the science, history, or natural history of religion, on the other hand from theology. As a subject *eo nomine* it has a brief and definite history (see below), and may be defined as the study of the religious consciousness as an expression of ultimate reality. Cf. RELIGION (preceding topics).

The history, science, or 'natural history of religion' (Hume) professedly confines itself to the comparative study of religions as phenomena of human action, with reference to the causes of their origin and the laws of their growth. It supplies, however, an element of breadth and continuity, in the absence of which the philosophy of religion suffers loss.

Theology, on the other hand, professes to deal with the ultimate real basis of religious aspiration, but is usually in truth a formulation of the postulates involved in some one of the great historical forms of ritual and belief, so that we speak of Anglican and Catholic theology; it fails, therefore, to deal with the universal and necessary nature and foundations of the religious attitude as such. Natural theology, indeed, the idea of which comes to us through St. Augustine from the Stoic thinkers, and which ought not to be confined, as in the 18th century physico-theology, to the 'argument from design,' has tended from the beginning to keep open a larger outlook on the world. The first definite attempt in Western literature to lay down 'canons of theology' was made by Plato, though what he meant by this expression was rules for imaginative art in its treatment of the divine nature. These were to the effect that God is not the author of evil, and is incapable of change and deceit. It should also be noted that the philosophy of religion, which is universal in its scope, is yet indebted to the Christian theology for very important ideas and principles. See below on the Ontological Proof.

Hume's *Natural History of Religion* (1757), superficial as it must appear from the standpoint of later knowledge, yet served as a protest against the narrower tendencies of the natural theology of the day, and was a starting-point both for the scientific history and for the philosophy of religion, by its appeal to inherent needs and tendencies of human nature as the ineradicable germ of the religious impulse. The Voltairean criticism, indeed, of the same period probably did much to make religion a generic name for one whole side of human faith and feeling, and thereby to give the subject a status among universal problems which later received a more serious treatment. The actual history of the term 'religion,' and of the time and context in which it or any such word first became a term of general application to the faiths and rituals of the world, would be an interesting chapter in the development of the human mind. Even Herodotus has some such general notion before him when he treats it as a proof of insanity to insult the sacred ordinances (*νόμαια*) of any people. Understanding that the substantive problem of the philosophy of religion, being inseparable from the general theory of reality, had been more or less directly treated by all great philosophers (notably by Plato and Spinoza), we may nevertheless attribute the distinctively modern preoccupation with the philosophy of religion *eo nomine* to the impulse communicated by Kant under the influence of Rousseau, and to the augmentation of historical material which also stimulated the science and history of religion. The outcome of Kant's critical researches, with their apparently negative result, in the whole romantic and idealistic movement, is a well-known chapter of the history of philosophy. By showing that there were certain greatest matters of life which could not be found among the objects of perceptive experience, he put men upon thinking of them rather as

the law and unity of our whole world than as certain phenomena among others that are contained in it. In the generations that followed him, these conceptions were fused with a mass of archaeological and anthropological knowledge which had long been gathering, and which historical circumstances contributed to enlarge; and under the banner of romanticism in literature and philosophy, a new interest arose in plastic art, in poetry, and in religion, as expressions of the spiritual life of mankind. In the first place, it should be noted that from this time forward, as the sacred books of various nations became accessible and progress was made in the art of personally investigating the religions of undeveloped races, the scientific history of religion, with its kindred anthropological inquiries, has been embodied in an increasing literature, of which the most valuable part is the most recent (see citations below). On this ground of science and history, after many aberrations, and as a result of immensely intricate researches, a consensus appears to be manifesting itself to the effect that from the beginning religion displays itself as a social phenomenon, depending on a sense of union or communion between a group of human beings and their god, cemented in early times by a social meal in which the god, himself a natural object, and yet regarded as a member of the group, is actually consumed by the other members in order that entering into their body and soul he may renew their life, which is one with his own. It is held that the other and very complex forms of sacrifice known to history are later developments of a primitive form such as this. Magic thus appears as the anti-social form of religion; the setting up of a private relation to powers other than, or in other ways than, those known to and utilized by the community. It is on this question of the contrast between magic and religion that the language and perhaps the ideas of Hegel have proved least in harmony with the researches of science. Thus early religion is one with social ritual, and pervades the whole of life. 'Religion is intimately wrapped up with the tillage of the fields, the pasture of the flocks, the rules and modes of wedlock, the customs of the market, with sanitary rules, with the treatment of disease' (W. Wallace, *Lects. and Essays*, 162). Something of this kind appears to be the central result which the scientific history of religion is tending to establish. It should be noted that the worship of deceased ancestors is not now held to have the importance, in the development of religion, which Spencer's theory assigned to it. Necessarily, this mode of treatment has less in proportion to say of the great religious systems which have been the occasions of a vast intellectual and imaginative activity, though here, too, the ritual and the popular faith remain, and demand investigation.

While the most valuable literature of the scientific history of religion is the work of the last thirty years, a substantially just account of the philosophy of religion would give primary rank to Plato, and include the deepest speculations of the greatest philosophers of the world. And even if we confine our account to the philosophy of religion *eo nomine*, which has flourished mainly since Kant, the greatest names in our history would be those of Kant himself, of Schelling, Hegel, and Schleiermacher, who are not to be found in the literature lists of the science and history of religion. Such an account would not be feasible within the limits of an article, and would moreover have to explain away a certain amount of historical misapprehension in the earlier thinkers due to the imperfection of the materials at their disposal. It will be best to state briefly the more important points of view which appear to be asserting themselves at the present day in the idealistic philosophy of religion, for, as distinct from the natural history of religion, there can hardly be said to be any other.

(1) We ask, how much do we include under the religious consciousness? Is it to be confined to a consciousness of God, or of the supernatural; or are the essentials of it to be found in states of mind which bear no explicit reference to what we should call God or to a supernatural world? Considering the variety of contents and purposes which are covered by the ideas in question, it seems impossible to make their shadowy common element the sole criterion of the religious consciousness, when other contents and purposes are found to play practically the same part in the actual experience of the human mind. The love of a person, or devotion to an idea, may apparently produce the peculiar religious effect, the effect of something which is at once an overmastering law of life and a source of strength outside our everyday being. This sense of loyal observance, of a rule in view of which we are moved at once by admiration and by fear, so that it has for us a value or necessity exceeding all other elements of life

put together, seems to coincide with the traditional and philosophical idea of a religion, no less than with the notions maintained, say, by David Hume, or by more modern writers on the natural history of religion. We may compare such expressions as these of Shakespeare:—

'Keep your promise with no less religion.'
As You Like It.

'When the devout religion of mine eye.'
Romeo and Juliet.

'How many a holy and obsequious tear
Hath dear religious love stolen from mine eye.'
Sonnets, 31.

'A coward, a most devout coward, religious in it' (i. e. devoted, vowed, persistent in it).
Twelfth Night.

A man's real religion, it may be said, is that set of objects, habits, and convictions, whatever it might prove to be, which he would die for rather than abandon, or at least would feel himself excommunicated from humanity if he did abandon. It would follow from this that his actual religion may differ in any degree from his nominal creed. On the other hand, it might be contended by students of the philosophy of religion that only those convictions which are called religious *par excellence* in the normal sense are capable of affording in the fullest degree that support, and that sense of triumphant unity, which seem to be the central facts of religious experience.

(2) The convictions which are called religious *par excellence* in the normal sense would commonly be admitted to be faith in God and in a future life, to which the Christian world would add, in one form or another, the doctrine of the Incarnation with the idea of triumph through sacrifice which attaches to it. The fundamental meaning of these forms of faith, that is to say, the answer which they give when we ask what truth they tell us about reality, is the central subject-matter of the philosophy of religion. Religious faith itself must of course be very clearly distinguished from the philosophical interpretation of it; although, on the other hand, there is no possible ground for denying religious value to the gnosis, or philosophical insight, in its genuine form as an endeavour to reinforce the unity of man as a perishing individual existence with something greater than himself. Faith in the ordinary sense is a kind of feeling. 'The word for true religion in the Lutheran language is Glaube, and the essence of Glaube is fühlen. "Du musst bei dir selbst im Gewissen fühlen Christum selbst, und unbeweglich empfinden dass es Gottes Wort sei"' (Wallace, op. cit., 56). Because it is 'immediate' it is apt to be confused with credulity, and, when including in its object an accretion of historical matter, it may really assume an aspect of credulity. But what it means is neither credulity, nor yet a critical knowledge of fact or of truth. It means (Schelling, 'Syst. d. gesammten Philos.,' 1804, *Werke*, Abth. i. Bd. vi. 558–9) 'what is at once heroism, faith, fidelity to yourself and to God—a trust and confidence in the divine which excludes or abolishes all choice.' It is essentially the conviction of a law in which the man is to live and act, and that this law is the best, or, strictly speaking, the only one possible for him. It would seem that human life can hardly be carried on without the presence of some such conviction, however fragmentary and however elementary. A certain courage and a certain guidance are needed for the mere conduct of existence from day to day; and the particular human being, if wholly deprived of the sense of unity with society and with the world, which is at the root of his reliance on his scheme of life, seems to perish like a plant deprived of warmth or nourishment.

The speculative interpretation and justification of religious faith is quite another matter than the apparently immediate feeling itself, and the question whether speculation does or does not constitute a form of religion seems to depend on the question whether it can be a mere piece of intellectualism, or whether it is a deeper experience, including the faith which it interprets.

The history of such speculation in the philosophy of religion centres round the 'ontological proof of the existence of God.' This argument is first explicitly known to history in the form given it by Anselm (1033–1109 A.D.), archbishop of Canterbury, who argued in substance that God as the greatest being conceivable must possess real existence; for if not, by conceiving of such a being as really existent we could conceive of something greater than him. It is an obvious answer that we cannot reason from essence to existence; we cannot infer that an object really exists, because real existence would enhance its perfection. This answer, made, as we are told, in Anselm's time, and repeated in substance by Thomas Aquinas, is much the same as the criticism offered by Kant. The discussion, however, has been resumed by Hegel and later writers with the view of showing that the

verbal fallacy of the argument is no bar to its containing substantial truth. It is urged that the idea of God is not that of an object in the world of objects, but rather that of an organic or spiritual whole with reference to which alone both self and the world are knowable. It becomes, in fact, in accordance with the Kantian criticism, rather an idea through which we know, than an idea of an object of knowledge. And therefore it is urged that to reason from the idea of God to his reality is merely to recognize the movement by which the unity of things makes itself explicit alike in the experience which we call ourselves and in the experience which we call the world.

Speculation of this type implies the principle of 'immanence,' that is to say, of the divine being as present and revealed in the life of nature and of mind. The Christian doctrine of the Incarnation is interpreted in this sense, namely, that man, humanity, is an essential embodiment of the divine, so that if the humblest human being had not existed, God would be other than he is. The idea of love and self-sacrifice, of passing through the finite, or dying to live, is thus taken to be included in the essence of the divine nature. The conception of a future life is understood from this point of view to bear witness to the conviction that the human spirit is continuous with a unity which is not truly presented in the perishing series of time, but in some way realizes the conception of eternity, not as endless duration, but as a perfect experience.

The danger of this line of speculation, and a natural criticism of it, may be expressed by the term Pantheism. It would be urged, against the objection thus indicated, that the term Pantheism properly applies, or would apply, only to views in which the universe was regarded at once as equally divine throughout, and as truly and really consisting in the congeries of contradictory appearances—the aggregate of objects and subjects—which compose it as seen by the normal human being. But the edge of the criticism is turned if we understand that, as presented in our experience, the world consists of appearances of unequal value and possessing various degrees of reality; degrees, that is, of the character which any experience must possess that is to be regarded as finally stable and free from contradiction. For thus we are not obliged to identify the divine nature equally with the good and the bad, the great and the trivial, which present themselves in the world as we know it. And this identification is the difficulty of Pantheism.

Recent speculation on the ultimate nature of the absolute reality has followed the general direction which has just been indicated. It is held that in a certain sense we are always experiencing reality, and that we can know at least in what direction to look for the better view of our experience which would remove its contradictions and permit it to be seen as part of an absolute whole.

(3) The different forms of creed and worship known to history are regarded from this point of view as stages and phases in the apprehension of the unity which includes both man's self and his world. Thus for the lower natural religions, it is held, the sense of social oneness and of alliance with the higher powers may find expression in the deification of some physical object; a relation of kinship between this object and its worshippers will then be the natural mode under which their common life will be realized. The fact that any such object must stand for more than it has power to express may help to account for the higher sense of a divine nature which sometimes comes to light among the very rudest populations, and which has recently been held to justify a revival of the theory of a degeneration from purer beliefs. The various phases of 'objective' religion, which represents in general the earlier stage of man's outlook upon the world, in contrast with the 'subjective' religions, such as Buddhism, Stoicism, and the later Judaism, when on the whole the mind has turned in upon itself and 'finds the voice of God mainly in the inner shrine of the heart' (E. Caird, *The Evolution of Religion*), are the content of such a philosophy of religion, in so far as it deals with the history of the imperfect religions.

(4) It follows from such a view that the distinction sometimes insisted on between ethical and non-ethical religions cannot really be maintained. From the first there is a tendency to rally some social group around the god, and to sanctify in his name some social ritual and observance; and wherever there are the beginnings of social unity and obligation there are also the beginnings of ethics.

Literature: the above account of the philosophy of religion follows chiefly the Gifford Lectures of Wallace (Lects. and Essays on Nat. Theol. and Eth., 1898) and The Evolution of Religion (by Edward Caird, 1893),

together with a recent article, entitled 'Anselm's Argument for the Being of God—its History and what it proves,' by CAIRD in the J. of Theol. Stud. HEGEL'S Philos. of Religion and Lects. on the Proof of the Existence of God (1832; Eng. trans., 1895) remain classical works on the subject; and especially the latter set of lectures, which he partly prepared for publication, represent in its earliest explicit form the view stated above as to Anselm's argument. SCHELLING'S work above referred to (Syst. d. gesammten Philos., 1804, Werke, Abth. 1, vi. 546 ff.) contains a pregnant statement of his views. SCHLEIERMACHER'S theological works and FEUERBACH'S Wesen des Christenthums are highly valued. For HERBERT SPENCER'S views see his First Princ., and Princ. of Sociol., iii. But it is a peculiarity of this study that, dealing with an experience which claims the highest reality, it cannot, so to speak, be properly pursued within its own limits. In HEGEL we must go to the Logik, as well as to the Philos. of Religion; in KANT to the three Critiques, as well as to the Religion innerhalb d. Grenzen d. reinen Vernunft. And this rule will lead us further. For the wellspring of genuine thought on religion we must go to PLATO (notably, for instance, to the account of the Form of the Good in the Republic), to SPINOZA, and in short to the great metaphysicians generally. Among recent works of this wider scope may be mentioned BRADLEY, Appearance and Reality (as also Ethical Studies by the same author); WARD, Naturalism and Agnosticism; and ROYCE, The World and the Individual; together with MCTAGGART'S criticisms and explanations of the Hegelian Logic (Studies in the Hegelian Dialectic, 1896, and more recent articles in Mind). For the science and history of religion, besides HUME'S Nat. Hist. of Religion above referred to (a brief work dealing with generalities), one may avail himself of JEVONS, Introd. to the Hist. of Religion; LANG, Making of Religion; and ROBERTSON SMITH, Religion of the Semites, which latter seems to be recognized as a classical authority. From these, and from TIELE'S art. Religion in the Encyc. Brit., and FRAZER'S Golden Bough (2nd ed.), a student may find his bearings in the immense literature of the subject. (B.B.)

Other notable books are PFLEIDERER, Philos. of Religion (Eng. trans.); MARTINEAU, The Study of Religion, and The Seat of Authority in Religion; LOTZE, Microcosmus and Philos. of Religion (Eng. trans.). See also PAULSEN, Introd. to Philos. (Eng. trans.), and the titles cited under the other topics RELIGION. Down to date, but written from a theological point of view, is CALDECOTT, Philos. of Religion in Eng. and Amer. (1901). (J.M.B.)

Religion (psychology of). (1) The psychological dispositions and processes which are essential to religion.

(2) The theory of the psychological factors in religious doctrines and constitutions.

The psychology of religion has not had due attention. The views which make religion essentially non-natural have either, on the one hand, regarded man as naturally unreligious or irreligious, or, on the other hand, cut the psychological cloth to fit the theological pattern. Positive views on the subject may be put under certain headings.

(1) The RELIGIOUS INSTINCT (q.v.) view. This finds in the religious motive an innate impulse, predisposition, or propensity (any one of these terms is better than 'instinct'). This, like all theories which rest on native endowment, closes the door to analysis, and, moreover, finds justification for constructing the so-called 'instinct' in the ways which religious or theological systems respectively demand.

(2) The Intuition view and the Intellectualists. The view that the idea of God is an intuition is associated with the 'instinct' view in finding something native and irreducible upon which to rest the justification of positive religion; it differs, however, from it in allowing an indefinite development of argumentation in support of the intuition. In this characteristic the intuition view lays emphasis upon the theistic 'proofs,' and thus the religious state of mind becomes largely 'belief,' based upon argument, or 'faith,' based upon authority, in dogmatic formulations concerning, or direct revelations issuing from, the divine being. Natural religion, or theology, and Deistic teleology were developed either in company with or independently of certain sacred books. This view, in which intellectual factors predominated, characterized ecclesiastic, mediaeval, and pre-Kantian thought generally. The completed intuition position arose as a restatement of intellectualism in view of the destructive criticism of Kant—the intuition of God being Kant's idea of God, considered not as a formal principle of theoretical reason, but, like the intuitions generally, as an immediate deliver-

ance of consciousness having objective validity. The Scottish philosophers, who were in their way psychologists first of all, attempted to work out a psychology of the intuitions, and in so doing led up to a religious psychology, properly speaking.

(3) The Analytic and 'Critical' point of view. This consists in an analysis, or at least an attempt at direct examination, of the developed religious sentiment. It is this which yielded the best psychological results till the beginning of the later psychological movement called below 'genetic.' It is here that the classical views of Kant, Herder, Schleiermacher, and Matthew Arnold, &c., belong—views which were permanent contributions to the subject, because they rested upon actual psychological facts. Kant and Schleiermacher may be taken as representative of Rational and Emotional views respectively.

(*a*) With Kant the central fact of religion is the idea of God, which is a regulative principle of the practical reason. The religious and the moral life stand together upon this postulate. Religion is recognition of God and reverence for him. This places the emphasis on reason, but reason as regulative of the life of practice. And furthermore, reason (Vernunft) is not intelligence (Verstand); and Kant's view of religion is therefore rational, not intellectual. He refutes the intellectual view by his famous criticism of the arguments for the existence of God (see THEISM), and also by his failure to find that, even as a principle of pure or theoretical reason, the idea of God is ontologically valid. Furthermore, with Kant religion is not an independent problem, and much less is the psychology of it; it comes into the philosophical or epistemological problem, inasmuch as the idea of God claims for itself theoretical and practical universality, and so enters into the sphere of pure and, in a different way, of practical reason. Yet, as in all other problems into which both psychological and epistemological factors enter, Kant's work is of the first importance, both as leading to the intuition view in the way mentioned above, and also—and more especially—in making necessary a reconstruction in which psychological facts should lead the way. This had not been possible so long as dogmatic theology and the logical argumentation crystallized in the 'proofs' remained uncriticized.

(*b*) The school of Schleiermacher—the Emotionalists so called—went further than Kant in denying to religion any sphere having separate intellectual content. The healing of the breach between Verstand and Vernunft, together with the reconciliation of pure and practical reason in the post-Kantian identity philosophy, left no dualism anywhere, no chasm on the right bank of which religion might perch and find its view directed backwards upon the secular, or experiential, fields of knowledge and faith. This made it necessary to find in religion some form of psychological reaction upon the one universal object—the absolute. This reaction is emotional, taking form in two phases of sentiment, which give character and furnish a criterion to religious experience. These are 'feeling of dependence' upon God, the object of worship, and 'feeling of mystery,' awe, or reverence towards him.

The work of this school has the advantage, from the psychological point of view, of pointing out definite psychological experiences as necessary to religion, a thing which the intellectualists found impossible. For the idea of God, whether content or intuition, is universal and, in so far, undefinable—especially as being universal in all experience. This led the way to the positive or scientific investigation which is now of the first importance, and which in its twofold form may be called 'genetic'; or, to say the least, it was in no way inconsistent with such investigation. Cf. RELIGION (evolution of).

(4) Genetic or Scientific. Research by the historical and evolution methods has taken on two great forms—anthropological and psychological, properly so named.

(*a*) The Anthropogenetic view: the treatment of religion as a great field of historical evolution. This is now yielding most important results. It is treated under RELIGION (evolution of); see also RELIGION (philosophy of), where certain of its results are pointed out. In addition, and as related to the psychological problem, we may note (1) that this study, by recognizing the essentially religious nature of primitive rites and cults, confirms the view that no one form of intellectual content—no one 'idea' as such—is necessary to religion. Rather what is common to low and high religions alike is certain active and emotional attitudes which ideas of various objects may call forth. Yet only such objects as *do* call these attitudes forth serve the religious motive, and this throws the actual criterion on the side of emotion and action. Here anthropology confirms the 'emotional' view (cf. *b*

below). (2) The objects of religious veneration, therefore, have a *symbolic* value. The gods are not experienced objects; they are objects fit for dependence, faith, reverence, and awe. This fitness or value is pitched higher as man develops and finds his experience reduced to objects obeying law. The God is ever the something behind the cloud, some one behind nature—the Great One who breaks law and works his will for his own, for ours, for a priest's, for a Redeemer's sake. And cults, religious institutions, ceremonials, sacrifices, &c., are attempts to cope with this unexperienced higher something; to bring into experience for satisfaction, help, salvation, that which cannot be found by sense or grasped in knowledge. (3) This, then, opens the question which psychology alone can answer: Why this constant drift, this groping beyond sense and thought, this demand—recurring in this form and that at every stage of more culture and of less culture—for a more-than-I, a being beyond, a God? This is the question of the impulse, propensity, spring of action which religion involves; and we come back to psychology and to the 'instinct' view in case no further analysis be possible. (4) In these investigations, moreover, the fact is constantly recognized that religion is a *social* phenomenon; no man is religious by himself, nor does he choose his god, nor devise his offering, nor enjoy his blessing alone. The whole is most intimately associated with social convention, custom, law—nay, often it is these things, and the whole of them. The priest is ruler, lawgiver, medicine man, no less than agent and embodiment of the divine efflatus. Religious sanctions often dictate social and ethical sanctions, and this dependence, at later stages of culture, is reversed. This is recognized as a safe result by the writers of both the articles RELIGION (philosophy of, q. v.) and THEISM (q. v.). (5) The object of religion is in *personal form*, whatever that may mean at the stage of evolution now reached, or then. This is one of the facts earliest observed, and perhaps the one most universally admitted by anthropologists. The theory of ANIMISM (q. v.), the GHOST THEORY (q. v.), that of ANCESTOR WORSHIP (q. v.), of religious PERSONIFICATION (q. v.), and of EJECTION (q. v.) all recognize and aim to formulate this class of phenomena.

(*b*) The Psychogenetic view. Here finally the appeal is made directly to psychological investigation; and having taken account of anthropological investigations as showing actual religious products embodied in institutions, the psychologist comes to his investigation with the checks and control afforded by so much historical knowledge. This narrows his quest; for if religion is an active and emotional experience, a social experience, and an evolutional or genetic experience, here are guiding threads of importance. Then, as to the object, it follows from the historical facts that the object of religion is a symbol, a meaning or INTENT (q. v.), not a content; it may preserve its meaning while changing its content. What genetic notion fulfils this condition? Again, how can this object be thrown into a series of *quasi-personal* forms, which always involve—create or result from—social relationships? This also restricts and aids the psychological determination.

The strictly psychological problem considered as meeting these requirements divides into two: we ask for an account (1) of the unity of religious experience, and (2) of the variety of religious experience. The question of unity is that of the one religious spring of action common to all religions and normal to normal individuals. The second question asks how this common impulse or motive takes the forms shown in different religions (comparative religion), in the genetic stages in the history of culture (evolution of religion), and in religious individuals (the psychology of prophets, religious seers, founders of sects, the inspired, the genius, &c.). The last named constitutes a variational psychology of religion, and can proceed only on the basis of the determination of the normal religious impulse, although by collecting data it may aid the former, as do variational statistics in other branches of inquiry. Very little has been done under this latter head (cf., however, James, *The Varieties of Religious Experience*, 1902, Gifford Lectures, published after this was written).

As to the unity of religious experience, the indications derived from anthropology may serve to guide. They make it necessary to say, first, that religious sentiment always involves three factors: (1) the recognition of other persons as standing in the same relation to the object of worship as myself, i. e. religion is a public thing involving duties and rights as between fellow men (the social factor); (2) the recognition of the religious object as also a person, of the same sort, though of higher character than my fellow man and myself (the personifying factor); (3) the reinterpretation of both the foregoing

factors with the genetic development of the thought of personality (the genetic personal factor).

These factors, taken separately, present problems having certain analogies in the psychology of the active life. The social factor is substantially the same problem as that of sympathy, notably as involved in the ethical: *how* do I recognize another as standing in the relation of duties and rights to myself, both being under a common law? Here the newer theory of 'ejection' is available; ego and alter are one thought through the reading into what is not-I of experience analogous to my own. The second or personifying factor also involves 'ejection'; yet here the reading-in is of the higher self—the law-abiding general or ethical self—which the private self-thought does not exhaust. God is a higher, a perfect self, having what the present writer has called 'projective' elements. The third problem is that of the genetic development of the personal self-thought to ever higher levels, from the organic to the impulsive, from impulse to intelligence, from intelligence to reflection; a development which carries with it the necessary reconstruction of the 'other' person, and also of the God-person, since it gives them its own character and content, by the fact of 'ejection. This, then, makes religion a function of a personal development which is also social; and an adequate theory of the rise of personal self-consciousness accounts *ipso facto* also for the religious life. The impulse to read self into others, i. e. to recognize the experience of being a self as more than individual, is all that a genetic account of religion requires.

Religious sentiment, then, falls generically in the class called personal sentiments—emotional dispositions arising about the thought of personality, ethical sentiment being also in this class. It remains, then, to determine the specific character of this sentiment—the marks which distinguish it from others of the class.

Here the determinations of the analytic and 'emotional' schools are of extreme value. The 'feeling of dependence' and the feeling of 'awe or reverence' are alike the results of analysis and the direct inference from religious ceremonial and rite. The gods are propitiated to secure their favour and to mitigate or appease their wrath—both motives of dependence. They are served and worshipped with rites which are mystical, magical, and symbolic—evidence in turn to the essential feeling of mystic awe with which they are approached. These two sentiments, therefore, stand out as by general agreement common and universal. They would seem, therefore, to give peculiar quality and coefficient to the religious state of mind; and they follow also from two other lines of inquiry, both of which yield psychological confirmation of the main result so far attained.

(*a*) The act of ejection whereby the self is read into another has a twofold significance: first, so far as it is of elements completely understood and experienced, the 'other'—in this case God—is known to be of such and such attributes and character. And these attributes, belonging to an infinite—or a very great—personality, may be gained for favour, or offended with loss. Just as we 'depend' on other persons who are situated to aid or damage us—the parent, the patron, the great friend—so, though to a fuller degree, we feel dependence on the Great Person of our faith.

But, second, ejection involves more. We find that our personal growth is one not merely of 'reading-in' into others, but of appropriation, of 'reading-in' into oneself. We constantly grow by imitative interpretation of the acts, habits, experience of others. There is thus a give-and-take—a 'dialectic'—of an ejective kind going on. Not only are there elements in the other person which we understand and intelligently anticipate with our feeling of dependence, but there grows up a habit of mind which hesitates before the unknown, the not-yet-learned elements of character of those from whom we learn. This we are not able to characterize in advance; it is mysterious, awesome. The sense of awe arises in the presence of the greater personality; here is therefore the origin of that aspect of religious emotion.

(*b*) The study of the actual rise of personal self-consciousness in the child adds—in the opinion of the writer—striking confirmation of these determinations. The genetic stages of the religious emotions are seen rising about the consciousness of self. And the consciousness of self grows up by the 'dialectic of personal growth' thus briefly indicated. Self is a social outcome, and with it religion, which is a function of this growth, is a social phenomenon as well (cf. the writer's *Social and Eth. Interpret.*, chaps. viii, x, which the section on the unity of religious experience mainly follows).

As to the varieties of religious experience, certain indications legitimately follow. The unity of religious experience is the unity of

normal self-consciousness; the varieties of religious experience indicate or flow from variations of self-consciousness. This point might be carried out in great detail. The alterations of self in the way of depression show themselves in all sorts of religious pessimism, melancholy, dejection, with corresponding sense of depression, conviction of sin, physical and moral laceration and asceticism. The exaltation of self, on the other hand, embodies itself in religious optimism, forms of personal alliance with God, inspiration, prophecy, visions, religious pride, and sinlessness. These, without exact description, are the opposed categories. Only the subtleties of change which personal self-consciousness undergoes in its variations or in normal temperamental varieties can serve as bases for tracing the actual varieties of religious experience. But the connection between the two is beyond dispute. Witness also the forms of so-called 'religious mania' and of other mental aberrations of which striking religious experience is a main symptom, and note the presence also of marked alteration of self-consciousness. It is a new religious personality which has the new revelation, inspiration, commission of vengeance, or other part to play, and it is in the structure of this consciousness of self that the reason of it is to be sought.

Literature: see the other topics RELIGION, also MAGIC, MYSTICISM, THEISM, SENTIMENT, and SANCTION. The social factor is emphasized by GUYAU, Non-religion of the Future (Eng. trans.); and ROYCE, Studies of Good and Evil, and The World and the Individual. Statistical studies are by COE, The Spiritual Life (1900); STARBUCK, Studies in Religion (based on slight and — *scribendo iudice* — defective 'syllabus' returns). Many anthropological treatises. See also under EJECT. (J.M.B., A.T.O., R.M.W).

Religion of Humanity: Ger. *Menschheitsreligion*; Fr. *religion de l'humanité*; Ital. *religione dell' umanità*. The religious system founded by Auguste Comte, in which the Supreme Being is Humanity, whose worship is to be maintained by a church organization, a priesthood, and an elaborate ritual.

The religion of humanity, which Huxley has characterized as 'Catholicism minus Christianity,' was a dream of Comte, which has never been fully realized. Outside of France it has had few adherents. In England the more intelligent advocates of POSITIVISM (q. v.) practically eliminate from it the hierarchical elements as well as the elaborate ritual, and tend to reduce it more and more to a sort of propaganda of social ethics.

Literature: COMTE, Works (Eng. trans. by H. Martineau); CONGREVE, Catechism of Positive Religion (1858); BRIDGES, A General view of Positivism (1865); CAIRD, The Social Philos. and Religion of Comte; F. HARNACK, art. in Nineteenth Cent. (1884). (A.T.O.)

Religious Consciousness (in psychology): see RELIGION (psychology of).

Religious Consciousness (in theology): Ger. *religiöses Bewusstsein*; Fr. *conscience religieuse*; Ital. *coscienza religiosa*. That aspect of man's consciousness by virtue of which he is capable of religious ideas and motives, and of volitional and emotional response to them.

The religious consciousness is sometimes called, in view of its principal object, the God-consciousness. In germ at least it is a possession of all humanity; the religious consciousness is sometimes regarded as the source of all religious truth and the organ of a progressive revelation. In this sense it stands opposed to the claim of objective historic revelation. (A.T.O.)

Religious Instinct: Ger. *Religionsinstinkt*; Fr. *instinct religieux*; Ital. *istinto religioso*. A spontaneous tendency in man's nature to respond to religious objects and motives, the response arising from impulse rather than clear cognition. 'Religious impulse' is the more proper term.

The existence of an impulse that may be called religious is disputed by such writers as Benjamin Kidd, who regards religion as superorganic and imposed from without. On the other hand, such writers as Henry Rutgers Marshall and J. Mark Baldwin affirm a native religious disposition as inherent in man's nature. (A.T.O.)

This use of the term 'instinct' is not recommended; 'impulse' is the proper word. Cf. the definitions (1) and (2) of INSTINCT, of which (1) is preferred. The same is true of many so-called 'human instincts'; e. g. of 'humanity,' of 'imitation,' 'aesthetic,' &c.; they are native impulses or predispositions, not instincts. For further analysis of the religious impulse see RELIGION (psychology of); cf. also the other topics RELIGION.

(J.M.B., G.F.S.)

Literature: B. KIDD, Social Evolution; H. RUTGERS MARSHALL, Instinct and Reason; J. MARK BALDWIN, Social and Eth. Interpret., chap. on 'Religious Sentiment.' (A.T.O.)

Remember [Lat. *re* + *memini*, to be mindful, through Fr.]: Ger. *sich erinnern an*; Fr. *se rappeler, se souvenir de*; Ital. *ricordarsi*. To exercise MEMORY (q. v.). (J.M.B.)

Remembrance. A term used in a very loose way to cover MEMORY, RECOLLECTION, and RETENTION (see those terms, also for foreign equivalents), or the result of the memory function generally. (J.M.B.)

Reminiscence: Ger. (1) *Anamnese, Wiedererinnerung*; Fr. *réminiscence*; Ital. *reminiscenza*. (1) Translation of Greek *ἀνάμνησις* (Plato): recovery in human experience (memory) of knowledge, of which in a pre-existent state the soul had direct intuition; hence the origin or appearance of the universal rational principles contributed to experience by the mind. Really a theory of the *a priori*. See Plato, *Phaedrus*, 259 c; *Phaedo*, 72 c, 75 c; cf. Eisler, *Wörterb. d. philos. Begriffe*, 'Anamnese' (also for later writers). Cf. SOCRATIC PHILOSOPHY (*d*).

(2) Used loosely for memory which is somewhat vague and inexact. (J.M.B.)

Remission (of sins, in theology) [Lat. *remissio*, from *remittere*, to relax]: Ger. *Vergebung* (*der Sünden*); Fr. *rémission* (*des péchés*); Ital. *remissione* (*dei peccati*). In the Christian scheme of redemption, that act of divine grace whereby the sinner is relieved from the penalty of his sin after its guilt has been removed by the atonement of Christ.

Pardon and remission are ordinarily used as equivalents; pardon, however, refers to the guilt of sin, while remission follows as a removal of the penalty. (A.T.O.)

Remonstrants [Lat. *remonstrare*, to protest]: Ger. *Remonstranten*; Fr. *Remontrants*; Ital. *Rimostranti*. The name given to the Arminians of Holland on account of their remonstrance against the sentence of the Synod of Dort condemning them as heretics.

Their adversaries, the adherents of Gomarus, replied with a counter remonstrance, and are called Contra-Remonstrants. (A.T.O.)

Remorse [Lat. *remorsus*, gnawed]: Ger. *Gewissensbiss*; Fr. *remords*; Ital. *rimorso*. Emotion of REGRET (q.v.) in which the grounds of sorrow include one's own ethical attitudes or acts; ethical regret.

The restriction to the ethical serves to give remorse a certain positive colouring, in which organic sensations, notably in the throat and digestive tracts, are prominent. There is also a certain setting of the muscles of throat and brow. The 'gnawing' of remorse, by which it occupies consciousness and torments, seems to arise from these sensations. The unethical forms of regret, on the contrary, 'feel' more intellectual—in the head—and are decidedly more contemplative, less conative. Remorse as an ethical emotion involves—certainly in most cases—a social reference, and is, therefore, largely confined to positive acts of wrongdoing. We do not speak of remorse for omissions of duty and neglect of opportunity—unless they lead to positive ethical consequences—although we do feel regret in these cases. Akin to remorse is REPENTANCE (q. v.), with contrition. (J.M.B.)

Remote [Lat. *remotus*, from *re* + *movere*, to move]: Ger. *zurückliegend*; Fr. *éloigné*; Ital. *rimoto*. The older word for which mediate has of late been generally substituted. See IMMEDIATE AND MEDIATE. So in the phrases 'remote object,' 'remote mark,' 'remote scibile,' 'remote witness.' The opposite of *remote* is *proximate*. (C.S.P.)

Remote cause: that which produces an effect (remote) through or with the production of another effect (proximate). (J.M.B.)

In law, *remote cause* is an act of which the agent is not responsible for the remote effects.

Remote matter. (1) In Aristotelian metaphysics: matter relatively less prepared for the reception of a given form, by having received accidents or by substantial forms. (2) In logic: the matter of matter. Thus, terms are the remote matter of syllogisms, being the matter of propositions, which are the proximate matter. (3) In the doctrine of the matter of propositions which we find in the *Summulae*, remote matter consists of terms of a proposition which, from the nature of their significates, cannot either of them be true of the other. (C.S.P.)

Rémusat, Charles François Marie, Comte de. (1797–1875.) Born, and educated for the law, in Paris. When in his twenties he studied philosophy and the history of literature. In 1836 he entered the Department of the Interior, and in 1840, under Thiers, became Minister of the Interior. In 1842 he was made a member of the Academy of Moral and Political Sciences. Banished from Paris, he was recalled in 1872 by Thiers.

Renaissance [Fr., from Lat. *re* + *nasci*, to be born]: Ger. *Renaissance*; Fr. *renaissance*; Ital. *rinascimento*. The period of revival of learning, art, and culture in Europe in the fourteenth (Italy) and fifteenth centuries. Cf. HUMANISM, and REFORMATION. (J.M.B.)

Rent [OF. *rente*]: Ger. *Rente*; Fr. *rente*; Ital. *affitto*. (1) The price paid for the use

of real estate. (2) That part of the return on real estate which is due to the value of the land as distinct from the improvements. (3) Any excess of price over cost; particularly when such excess is due to the possession of a differential advantage. Cf. MONOPOLY.

Adam Smith used the word nearly in its first, or commercial, sense. Ricardo separated the return to capital from the return to land, and developed the second sense of the term (see DIMINISHING RETURN), which is known as economic or Ricardian rent. Mangoldt, Walker, Marshall, and others have shown that many other agents of production are remunerated under laws similar to those which Ricardo developed with regard to land. These returns are sometimes called *quasi-rents*; sometimes the term rent is so extended as to cover all these gains, as in definition (3). Even the differential advantages of consumers, so far as they are subject to similar laws, are brought under the name CONSUMER'S RENT (q. v.). (A.T.H.)

Repentance (in theology) [Lat. *repoenitentia*, through Fr.]: Ger. *Reue*; Fr. *repentance*; Ital. *pentimento*. That change of mind in which a sinner, realizing the true nature of his sin, seeks divine forgiveness and purposes to live a new life.

Repentance is more than sorrow for sin or a sense of its guilt; it includes an active seeking for divine forgiveness, and a purpose to sin no more. According to the Roman Catholic doctrine, repentance must be accompanied by penance, inasmuch as the temporal effects of sin remain after its mortal guilt has been removed. Protestants repudiate this distinction, and hold that the divine grace freely remits all the effects of sin, both eternal and temporal, so far as these lie in the province of grace and not of nature.

Literature: see PENANCE. (A.T.O.)

Repose [Lat. *reponere*, to lay or place back]: Ger. *Ruhe*; Fr. *repos*; Ital. *riposo*. (1) Quiet, rest, calm; especially such composure of soul as excludes all agitation by passion or desire, and is suggestive of order, moderation, and often of dignity or latent power. (2) Art: such disposition of masses or pose of figure in stable equilibrium (in architecture or sculpture), or such shaping of features, or general simplicity, moderation, and harmony (in sculpture or painting) as to favour or express composure.

Repose was brought forward as an aesthetic category by Winckelmann (1765), who made it the distinctive characteristic of Greek art, as the most important mark of 'beauty' as contrasted with 'expression.'

Literature: WINCKELMANN, The Hist. of Ancient Art; BROWN, The Fine Arts, 273. (J.H.T.)

Represent [Lat. *re* + *praesentare*, to present]: Ger. *repräsentiren*; Fr. *représenter*; Ital. *rappresentare*. To stand for, that is, to be in such a relation to another that for certain purposes it is treated by some mind as if it were that other.

Thus a spokesman, deputy, attorney, agent, vicar, diagram, symptom, counter, description, concept, premise, testimony, all represent something else, in their several ways, to minds who consider them in that way. See SIGN. When it is desired to distinguish between that which represents and the act or relation of representing, the former may be termed the 'representamen,' the latter the 'representation.' (C.S.P.)

Representamen: see REPRESENT.

Representation: Ger. (1) *Vorstellung*, *Idee*, (2) *Repräsentation*, (*reproducirte*) *Vorstellung*; Fr. *représentation*; Ital. *rappresentazione*. (1) A cognitive state considered as copying or in some sense representing its object.

(2) Recurrence of presentation.

(3) See REPRESENT; see also SIGN (in logic), and INDEX (in logic).

The first is the old usage. Hamilton (*Lects. on Met.*) classifies theories of knowledge as immediate and representative. The theory goes back to the Greek doctrine of εἴδωλα or images. Spencer (*Princ. of Psychol.*), who adopts this usage, uses re-representative for states which represent a representation—stand for something which stands for the object.

The second usage contrasts representation with presentation, as idea is contrasted with impression in the terminology of Hume (cf. Baldwin, *Elements of Psychol.*, 'Glossary'). This usage is current in the French (e.g. Rabier, *Leçons de Psychol.*). The contrast with presentation is difficult in view of the use of presentation as translation of the German Vorstellung (see PRESENTATION); and since we have the word idea in about the same sense, representation is not likely to be much used in the second sense. On the German use of Repräsentation see Erdmann, *Arch. f. syst. Philos.*, vii. (1891) 446. (J.M.B., G.F.S.)

Representationism: Ger. *Repräsentationismus*; Fr. *représentationisme*; Ital. *rappresentazionismo*. The doctrine that percepts stand for something behind them. See COSMOTHETIC IDEALISM, and IDEALISM.

In a certain sense it must be admitted, even by presentationists, that percepts only perform the function of conveying knowledge of something else. That is to say, they have to be combined and generalized to become useful knowledge; so that they may be said to represent their own generalizations. In this, representationists and presentationists may agree. But the dispute between them consists in this, that the representationist regards the percept in the light of testimony or a picture, from which by inference, or a mental act analogous to inference, the hidden cause of the percept may become known; while the presentationist holds that perception is a two-sided consciousness in which the percept appears as forcibly acting upon us, so that in perception the consciousness of an active object and of a subject acted on are as indivisible as, in making a muscular effort, the sense of exertion is one with and inseparable from the sense of resistance. The representationist would not allow that there is any bilateral consciousness even in the latter sense, regarding the bilaterality as a quasi-inference, or product of the mind's action; while the presentationist insists that there is nothing intellectual or intelligible in this duality. It is, he says, a hard fact experienced but never understood. A representationist will naturally regard the theory that everything in the outward world is atoms, their masses, motions, and energy, as a statement of the real fact which percepts represent. The presentationist, on the other hand, will more naturally regard it as a formula which is fitted to sum up and reconcile the percepts as the only ultimate facts. These are, however, merely different points of view in which neither ought to find anything absolutely contrary to his own doctrine. (G.S.P.)

Representative Government: see GOVERNMENT, and STATE.

Reprobation (in theology) [Lat. *reprobare*, to disapprove, condemn]: Ger. *Verdammung, Verwerfung*; Fr. *réprobation*; Ital. *riprovazione*. The passing over, in the divine decree of election, of a portion of the human race, so that they are left to perish in their sins.

In Roman Catholic theology the term is also applied to the eternal condemnation of the sinner who dies impenitent as distinguished from the condemnation of the penitent sinner to purgatorial fire.

Literature: see DECREES, PREDESTINATION, and PURGATORY. (A.T.O.)

Reproduction [for deriv. see PRODUCTION]: Ger. *Reproduktion*; Fr. *reproduction*; Ital. *riproduzione*. The recurrence of a content of consciousness considered as dependent on its previous occurrence. Cf. MEMORY, EVOCATION, RECOLLECTION, and REVIVAL.

Reproduction must be distinguished from repeated production. If I look at a tree, then look away, and then look at it again, the recurrence of the visual experience is not a reproduction; it is due to a repetition of the stimulus, and is to that extent independent of my having seen the tree before. But if after I have gone out of sight of the tree a mental image of it rises before consciousness, this is a reproduction; for the mental image owes its existence to the previous existence of the percept. It is obvious that the possibility of reproduction presupposes a persistent after-effect left by the original experience; such an after-effect is a trace or disposition.

Reproduction may be either free or determined by ASSOCIATION (q. v.). So far as it is free, it seems to be mainly determined by dispositional interest (see under INTEREST). The thoughts of the lover tend to fix on his mistress whenever he is not otherwise preoccupied. No associational cue seems necessary to set them in this direction. The same holds good of other absorbing interests. Any unsatisfied conative disposition tends to become conscious spontaneously, and the greater its intensity and complexity the stronger is the tendency. (G.F.S., J.M.B.)

Reproduction (experiments on, and method of): see MEMORY (experiments on).

Reproduction (in biology): see AGAMOGENESIS, FERTILIZATION, FERTILITY, and SEXUAL REPRODUCTION; and cf. HEREDITY, PHYSIOLOGICAL SELECTION, REPRODUCTIVE SELECTION, and STERILITY.

Reproductive (or **Genetic**) **Selection**: Ger. *genetische Selektion*; Fr. *sélection génétique*; Ital. *selezione genetica*. The theory according to which the most fertile individuals of one generation produce a large proportion of the next and, by the inheritance of fertility, also of subsequent generations, and so establish any characters which may be correlated with their relatively great fertility.

The theory was propounded and worked out by K. Pearson, and demonstrated for certain statistical data. Its importance as a factor in the theory of descent would seem to depend on the presence and variety of characters which are in uniform correlation with, or in some degree vary with, variations

in fertility. If largely effective it would in part work the preponderance or 'survival' of certain characters hitherto ascribed exclusively to the struggle for EXISTENCE (q. v.) with the elimination of the unfit. See FERTILITY (also for literature), and SELECTION (in biology). (J.M.B., E.B.P.)

Republic: see GOVERNMENT, STATE, and DEMOCRACY.

Repugnance [Lat. *re* + *pugnare*, to fight]: Ger. *Repugnanz*; Fr. *répugnance, incompatibilité*; Ital. *ripugnanza*. The relation between two propositions which can neither be true nor false together. (C.S.P.)

Repulsion: see ATTRACTION.

Res [Lat.]. THING (q. v.). In phrases: see IN ESSE, &c. (J.M.B.)

Res (in law) [Lat. *res*, thing]. (1) Property which is the subject of a claim.

An estate in settlement before a court of probate is viewed as property in its possession. 'That court has possession of the *res*, and the proceedings before it are in the nature of proceedings *in rem*' (Rockwell *v.* Bradshaw, 67 Conn. Law Reports, 18). *Res nullius*: property claimed by the possessor, of which there was before no owner, e. g. wild animals, derelicts, or goods intentionally abandoned.

(2) In expressions: a thing. *Res gestae*: things done, including words said, in connection with another act in such a way as to throw light upon its character, and therefore admissible in evidence for that purpose. *Res adiudicata*: a matter settled by previous adjudication. *Res integra*: a point of law not previously settled by adjudication. *Res mancipi*: property transferable by *mancipium* under the old Roman law. *Res extra commercium*: things not the objects of private rights. By the Roman law these comprised *res divini iuris*, *res publicae*, and *res omnium communes*.

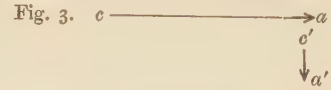
Right *in rem*: a general or absolute right to a thing availing against every one. Action *in rem*: an action to enforce such a right; also, in admiralty, an action against a thing, e. g. a ship, not naming any persons as defendants, to enforce a maritime lien. (S.E.B.)

Res de re praedicari non potest [Lat.]. Formula of NOMINALISM (q. v.), according to which universals have no independent reality. Cf. UNIVERSAL. (J.M.B.)

Resemblance [Lat. *re* + *similis*, like]: for foreign equivalents see LIKENESS OR RESEMBLANCE. The possession of an aspect or feature by two or more objects, in respect to which one of them might be taken for another, constitutes a resemblance, likeness, or similarity between or among these objects.

Objects are 'dissimilar' in respects in which DIFFERENCE (q. v.) characterizes them, and 'diverse' when these differences are qualitative. Various connections in which resemblance plays part in ancient and modern discussions are noted under LIKENESS OR RESEMBLANCE, IDENTITY (various topics), INDIVIDUAL, and RESEMBLANCE (consciousness of). Cf. also DIFFERENCE.

ILLUSTRATIONS.

	Psychological.	*Biological and Physiological.*
A. *Amimetic Resemblance.*		
I. Coincident Resemblance: ANALOGY. Fig. 1.	Like results from Darwin's 'analogous feeling stimuli.' Same movement, both reflex and voluntary.	ANALOGOUS ORGANS, HOMOPLASY, CONVERGENCE, Darwin's 'analogical' or 'adaptive' resemblance, syncryptic resemblance, COINCIDENT VARIATIONS.
II. Recurrent Resemblance: Reduplication. Fig. 2.	Recurrent psychic states from same nervous stimulation, 'alternating' psychoses, 'recurrent' insanity.	Reduplicated organs, results of REPRODUCTION, and HEREDITY.
B. *Mimetic Resemblance*: MIMETISM.		
III. Serial Resemblance: 'Circular' functions. Fig. 3. 	Results of pathological mimetism, LALLING, CONTAGION (psychological and social), plastic imitation, psychological mimetism.	CIRCULAR REACTION, self-repeating functions, results of biological MIMICRY (q. v., 4).
IV. Imitative Resemblance: Conscious IMITATION. Fig. 4.	Results of conscious and persistent imitation and volition, self and inner imitation, aesthetic SYMPATHY.	Results of self-imitative psychophysical functions.

Resemblance considered as a fact of observation enters into many current topics of science. There are certain general headings under which the various recognized forms of it may be classified. The accompanying table shows the results of such a classification, the principal headings of which are defined below, and in which the small capitals indicate topics treated separately *sub verbis*.

Amimetic resemblance. Resemblance between two objects (a, a') produced quite independently of each other, either by (i) separate causes (c, c', Fig. 1), or (ii) by the same cause (c, Fig. 2). These two cases (of which, as of those following, illustrations are given in the columns to the right in the table) may be called respectively 'coincident' and 'recurrent' resemblance.

Mimetic resemblance or mimetism. Resemblance in which one of the objects (that which is resembled) itself enters into the determination of the other (that which resembles the former) in the respect in which the resemblance holds good. Here, again, we have two cases, in one of which (iii) the copy, model, or object resembled (a) is itself the sole or efficient cause (c') of the other object (a')—its own cause (c) not acting (Fig. 3)—and in the other of which (iv) a second cause (c'') enters with the object a (considered as cause c'') into the production of a' (Fig. 4). These two sorts of resemblance we may call respectively 'serial' and 'imitative' resemblance—names, as before, which the study of the illustrations given in the table has suggested. (J.M.B., G.F.S., E.B.P.)

Resemblance (consciousness of): see LIKENESS OR RESEMBLANCE.

There has been much discussion on the distinction and interrelation of resemblance and identity. The main question at issue is whether all resemblance ought to be regarded as a partial IDENTITY (q. v.) (i. e. material as distinguished from individual identity). It has been recently maintained by certain writers, in particular by James and Stumpf, that this view is inapplicable to simple sensible qualities. When we say that purple resembles blue on the one hand and red on the other, according to them this cannot mean that purple is partially identical with blue and also partially identical with red; for purple is a simple quality, not a mixture. Logically, this position does not seem tenable. For how can the same quality have two distinct relations grounded on its own intrinsic nature if it contains no complexity? Practically, the question only becomes important when assumed complexity or simplicity forms the starting-point for theoretical reasoning or practical adjustment. If the adherents of the simplicity view affirmed that a very blue purple cannot reproduce an idea by association which a pure blue could reproduce, they would be bringing the problem to a definite issue. If blue purple can function in mental process instead of blue, an element of blueness must belong to it, because this element is operative. (G.F.S.)

Resemblance (law of). A principle of the ASSOCIATION (q. v.) of ideas, according to which RESEMBLANCE (q. v.) between two mental objects of any kind is the reason of the recall of the one on the presence of the other.

This law, called also the 'law of similarity,' is commonly reduced to that of CONTIGUITY (q. v.)—a reduction dating back at least to Th. Brown—the elements, in each of the objects, which constitute them similar being identical and contiguous in each with the remainder of the object respectively. (J.M.B.)

Resentment: Ger. *Verdruss, Missbilligung*; Fr. *ressentiment*; Ital. *risentimento*. An emotion of displeasure arising from a sense of injury to oneself or another, and prompting to the resistance of such injury. Cf. ANGER, HATE, MALEVOLENCE, and REVENGE.

Butler uses the term to designate the principle in human nature 'which appears the direct contrary to benevolence.' As the latter principle is a desire for the good of others, the former is a desire for their hurt or evil. 'Resentment is of two kinds: hasty and sudden, or settled and deliberate. The former is called anger, and often passion;' its evil consists in the unreasonableness of its occasion or the immoderateness of its degree or duration, not in its intrinsic nature. Deliberate resentment, on the other hand, 'seems in us plainly connected with a sense of virtue and vice, of moral good and evil.' Such resentment is not to be confused with malice. 'It is resentment against vice and wickedness: it is one of the common bonds by which society is held together; a fellow-feeling, which each individual has in behalf of the whole species, as well as of himself' (*Sermons*, viii. §§ 5, 8). (J.S.)

Reservation (mental): see EQUIVOCATION.

Residual: see ERRORS OF OBSERVATION.

Residues (method of) [Lat. *residere*, to remain]: Ger. *Restmethode*; Fr. *méthode des résidus*; Ital. *metodo dei residui*. A

method by which complicated phenomena are accounted for when one feature modifies another.

Thus, in the case of the motion of a planet, we first observe that it makes the circuit of the heavens from east to west once in twenty-four hours. But this is not exact; and if we note its place among the fixed stars at successive oppositions, we find that it moves, in a nearly uniform manner, from west to east. But this is not exact, for at one part of the heavens it always moves faster than at the opposite part, according to Kepler's laws. But this is not exact, for the part at which it moves fastest itself revolves very slowly, &c. Then going back to more obvious motions, when it is not in opposition it describes loops, of which one feature after another has to be taken account of. This is the general procedure of the method.

Literature: Sir J. F. W. Herschel, On the Study of Nat. Philos.; Jevons, Princ. of Science; Masci, Logica, 417. (C.S.P.)

Residuum: see Trace.

Resignation [Lat. *resignare*, to resign]: Ger. *Entsagung*; Fr. *résignation*; Ital. *rassegnazione*. (1) Emotional disposition of calm acceptance of the fortune, and of renunciation of craving and desire. Not an exact term. Cf. Asceticism.

(2) A term in the ethics of the 'Stoic School'; see Schools of Greece, and cf. Apathy. (J.M.B.)

Resistance [Lat. *resistere*, to withstand]: Ger. *Widerstand(-sfähigkeit)*; Fr. *résistance*; Ital. *resistenza*. That which withstands, opposes, or acts against a physical force.

Electrical resistance: property of a conductor which opposes the passage of an electric current. It is measured in ohms; the unit, or ohm, being the resistance offered by a column of pure mercury 104·81 cm. long, 1 mm. square, in section at 0° C.

Resistance coil: a coil of wire of known resistance.

Resistance box: a number of such coils arranged in a box; for use in regulating strength of electric potentials. (C.F.H.)

Resistance (sensation of): Ger. *Widerstandsempfindung* (or *-gefühl*); Fr. *sensation de résistance*; Ital. *sensazione di resistenza*. The sensation of opposition to muscular movement or obstruction of it. (J.M.B.)

The sensation of articular pressure is sometimes considered the 'sensation of resistance' (see Sensation), which is reported by the organs of touch and movement (skin, tendon, muscle, and joint). Among the sensations furnished by these latter, the sensation of Tendinous Strain (q. v.) perhaps ranks next in importance after the articular sensation.

Literature: Külpe, Outlines of Psychol., 145; Bastian, Brain as Organ of Mind, 695. See also Articular Sensation, Muscular Sensation, and Effort (bodily). (E.B.T.)

Resolution [Lat. *re* + *solvere*, to loose]: Ger. *Entscheidung* (Judd); Fr. *résolution*; Ital. *risoluzione*. The mental determination of a purpose; the act by which a Project (q. v.) passes into a Purpose (q. v.).

Wundt makes the distinction between resolution and Decision (q. v.) embodied in the definitions. (J.M.B.)

Respect [Lat. *respectare*, to look again]: Ger. *Achtung*, *Respekt*; Fr. *respect*; Ital. *rispetto*. Sentiment accompanying the recognition of what is excellent or even normally good in a person.

Respect is a term of less positive meaning than Honour (q. v., meaning 1). We retain respect for a person when he fulfils normal or average expectations; we honour him when he surpasses them. Yet respect attaches more intimately to personality: we may honour a man for his gifts, attainments, &c., after we lose respect for his character as a whole. Respect is essential to the higher sentiment, Reverence (q. v.). (J.M.B.)

Responsibility (consciousness of) [Lat. *respondere*, to respond]: Ger. *Verantwortlichkeit*; Fr. *responsabilité*; Ital. *responsabilità*. The consciousness of obligation attaching to the knowledge that one's acts of voluntary conation have been or may be effective in the determination or conditioning of subsequent events; for these events the actor calls himself, and others call him, in so far responsible.

This may be called psychic responsibility if we make a distinction between Psychic and Psychological (q. v.). Psychological or real responsibility, including moral and legal Responsibility (q. v.), covers the case of effective determination of a stream of events by voluntary conation, whether the actor is conscious that this is the case or not. The difficulties gathering about the subject seem to be due (1) to the singular fact that the individual's psychic responsibility is often an *ex post facto* thing, attaching 'after the event' to many items which he did not consciously intend or foresee. The man who shoots his friend in mistake for a burglar, feels a certain responsibility for his friend's orphaned chil-

dren. The man who competes successfully feels a certain responsibility for his ruined commercial rival. This makes it impossible to measure even psychic responsibility in terms of end or intent. And (2) ethical and legal responsibility are still wider; they are not coterminous either with the responsible actor's end or with his consciousness of responsibility. It is, therefore, of the greatest importance that the distinction between psychic and psychological be here observed. (3) The matter is still further complicated by the psychological fact that psychic responsibility is not limited to the immediate nor yet to the remote consequences of volitional acts, but extends to all voluntary acts, whether positive or negative, and even to some which are only potentially or possibly volitional. In short, it is only those actions which are aconative (non-voluntary) or contra-conative (compelling) for which we feel no responsibility. This is reflected in the theory of INTENTION (q. v.) in law, and in the definitions of responsibility in criminal law—intention including permitted and omitted no less than committed acts, and being 'imputed' whether existing psychically or not. For the still further extension of the conception in law see RESPONSIBILITY (in law). Cf. also SANCTION (the various usages).

Literature: see the sections on Freedom and Responsibility in the textbooks of psychology and psychological medicine. (J.M.B.)

Responsibility (in law). The obligation to answer for an act done, to the extent of the sanction provided by law.

It does not necessarily presuppose any wrongdoing on the part of the person so held responsible. The law may make a railroad company responsible for fires set by its locomotives, though every care was taken to prevent the escape of sparks. A master may be held for an act of his servant done contrary to his orders. Responsibility for an act extends to all its natural and direct consequences. In criminal cases, responsibility is generally dependent on a wrongful intent, but such an intent is ordinarily inferred from the act. Insanity or mental incapacity may rebut or exclude such an inference. A statute may also impose a penalty, without regard to the defendant's intent, as by holding him criminally responsible for the act of his servant.

Literature: IHERING, Zweck im Recht, and Geist des römischen Rechts auf den verschiedenen Stufen seiner Entwicklung; SOHM, Inst. of Roman Law, chap. ii. (S.E.B.)

Responsibility (moral and social). Obligation attaching to acts of voluntary conation to the extent to which they are considered as determining or conditioning ethical or social relationships.

This falls under psychological or real responsibility as contrasted with psychical (see RESPONSIBILITY, consciousness of). We say a man 'does not realize his responsibilities'; yet he is held to them, nevertheless. The term moral responsibility is often used to include both ethical and social situations, and is contrasted with RESPONSIBILITY in law (q. v.); as in cases of social ostracism or condemnation for actions not legally forbidden. (J.M.B.)

Responsibility is a favourite idea of the intuitional school, who deduce from this essential property of a moral being the freedom of the human will. Mill and others, on the contrary, argue that responsibility means simply liability to punishment, and that, since the will is determined by the strongest motive, punishment is justifiable as an influence necessary to strengthen the weak will of the wrongdoer. Responsibility has often been interpreted theologically, though frequently also it has been understood as responsibility to one's own rational nature or conscience. Butler distinguishes the responsibility of man as a moral agent from the irresponsibility of things. 'A machine is inanimate and passive: but we are agents. Our constitution is put in our own power. We are charged with it; and therefore are accountable for any disorder or violation of it' (Preface to *Sermons*, § 13). (J.S.)

Rest: see MOTION AND REST.

Rest (organic) [AS. *ræst*]: Ger. *Rast, Ruhe*; Fr. *repos*; Ital. *riposo*. Cessation of active work to promote the building up in an organ or organism of compounds of higher potential energy and the elimination of waste 'fatigue' substances. Cf. ANABOLISM, and SLEEP. (C.F.H.)

Restraint (1) and (2) **Constraint** [Lat. *re* and *con* + *stringere*, to check]: Ger. (1) *Selbstbezwingung*, (2) *Zwang*; Fr. (1) *frein*, (2) *contrainte*; Ital. (1) *raffrenamento*, (2) *costrizione* (*morale*). The essential and common meaning of these terms is complete or partial arrest; yet what difference there is between them suggests a distinction between (1) self-arrest, as in the phrase 'self-restraint,' for which we never use the other term, and (2) arrest by some cause, reason, or principle foreign to the self, as in the phrases 'external constraint,' 'I am constrained to do this.' This distinction might well be made more general.

It would make all self-control, all ordering of the intellectual and moral life, restraint, not constraint, so far as we find it to be self-regulative.

Another distinction sometimes made, i.e. that restraint is negative or arresting and constraint positive or furthering, can hardly be maintained. Cf. CONSTRAINT (social), and SANCTION. (J.M.B.)

Restraint (ethical): see CONSCIENCE, IMPERATIVE (categorical), and SANCTION.

Result [Lat. *resultare*, to spring back]: Ger. *Ergebniss, Resultat*; Fr. *résultat*; Ital. *risultato*. Any determination considered as following upon the forces or conditions which enter into it. Cf. FORCE AND CONDITION.

Used principally for effect (see CAUSE AND EFFECT); but also for CONSEQUENCE, CONSEQUENT, logical CONCLUSION, ACTION (as following upon will), 'solution' in mathematics, &c. Cf. the topics in small capitals. (J.M.B.)

Resultant [Lat. *re* + *salire*, to jump, spring]: Ger. *Resultante, mittlere Kraft, Diagonalkraft*; Fr. *résultante*; Ital. *risultante*. The simplest force, or system of forces, which is the equivalent of several given forces.

If the forces act on a point, or pass through a common point, the resultant is a single force acting on that point with an intensity and direction determined by the law of COMPOSITION OF FORCES (q.v.). (S.N.)

Resultant Tone: Ger. *resultirender Ton*; Fr. *son résultant* (L.M.); Ital. *suono risultante*. (1) Tyndall's name for COMBINATION TONE (q.v., also for foreign equivalents).

(2) Melde's name for the intermediate tone that carries the BEATS (q.v.) when the pitch of the two primaries is separated by an interval less than the musical semitone. See *Pflüger's Arch.*, lx. (1895) 623. (E.B.T.)

Resurrection [Lat. *resurrectio*, from *resurgere*, to rise again]: Ger. *Auferstehung*; Fr. *résurrection*; Ital. *risurrezione*. The doctrine that the bodies of the dead shall be restored to life and reunited to their souls in such manner that continuous personal identity will be maintained.

The doctrine of the resurrection is not to be confounded with that of the immortality of the soul. A form of bodily renewal is involved in the transmigration doctrine of the Orientals and of Platonism. The resurrection is dimly foreshadowed also in the Old Testament. But it is raised to a dogma only in Christianity, where the resurrection of Christ is made a pledge of the resurrection of the saints. The last judgment is to be preceded by a general resurrection.

Literature: ALGER, Doctrine of Future Life; BURNET, State of the Dead (London, 1835); ZEHRT, Über die Auferstehung; HODGSON, Resurrection of Human Body (1853). (A.T.O.)

Retention [Lat. *re* + *tenere*, to hold]: Ger. *Aufbewahrung*; Fr. *conservation, rétention*; Ital. *ritenzione, (il) ritenere*. (1) The persistence of after-effects of mental process considered as conditioning or determining REPRODUCTION (q.v.). (G.F.S.–J.M.B.)

(2) The persistence of the mental DISPOSITION (q.v.). (G.F.S.)

(1) An after-effect of previous experience is necessary to reproduction—to the partial repetition of the original experience without repetition of the original conditions of its occurrence. This usage is recommended. (G.F.S.–J.M.B.)

(2) If a process has continuity of interest, each phase of its development must be determined by the persistent after-effect of previous phases. When we hear one sound after another, and immediately judge that the second is louder than the first, it is by no means necessary that in framing the judgment the first sound should be present to consciousness as a mental image at the same time with the second. But the first must leave behind it some after-effect which so modifies the second as to determine the judgment. This may also be called retention. (G.F.S.)

Retentiveness. The power of RETENTION (q.v.). (J.M.B.)

Retina [Lat. *rete*, a net]: Ger. *Netzhaut*; Fr. *rétine*; Ital. *retina*. The innermost coat of the eyeball, consisting of a screen of nerve elements, some of them especially modified, upon which the image is normally focussed, and which act as the optical nervous mechanism for visual sensations. See Eye under VISION. (C.F.H.)

Retinal Light: see IDIO-RETINAL LIGHT.

Retinal Oscillation: Ger. *oscillirende Netzhauterregung*; Fr. *réaction oscillatoire de la rétine*; Ital. *reazione oscillatoria della retina*. See RECURRENT VISION.

Retinal Rivalry: Ger. *Wettstreit der Sehfelder*; Fr. *antagonisme* (or *lutte*) *des champs visuels*: Ital. *antagonismo* (or *contrasto*) *dei due campi visivi*. When the two retinas are stimulated simultaneously by strong lights of different colour (rivalry of colours), or are confronted with fields that cannot be given a unitary interpretation (rivalry of contours),

there results a peculiar instability of impression, an irregular alternation of colours or figures in the combined field, which is known as 'retinal rivalry.' Cf. COLOUR MIXTURE (binocular). The phenomenon has been explained in terms of attention (Helmholtz) and in purely physiological terms (Hering).

Literature: HELMHOLTZ, Physiol. Optik (2nd ed.), 916, 924; HERING, in Hermann's Handb. d. Physiol., III. i. 380–5; Beitr. z. Physiol., 308 ff.; H. PARINAUD, in Ann. d'Ocul., cxix (1897). (E.B.T.)

Retribution [Lat. *retributio*, from *retribuere*, to repay]: Ger. *Vergeltung*; Fr. *rétribution*; Ital. *retribuzione*. The reward or punishment which awaits the soul in the future state of existence on account of the merit or demerit of the present life. In Christian theology, the future punishment of those who reject the offer of salvation and die impenitent.

The notion of retribution in the general sense is prominent in the religious thought of both East and West. The idea is usually associated with the process of transmigration through which the soul works out its destiny. The principle of retribution in Hindu thought is Karma, which is the very soul of transmigration itself. The Christian scheme is unfavourable to the notion of transmigration, and the tendency is to regard retribution in the light of finality. There are bodies of Christians, however, who hold to limited retribution and the final salvation of all men.

Literature: see KARMA, PUNISHMENT, TRANSMIGRATION, and UNIVERSALISM. (A.T.O.)

Retrospection and **Retrospective Reference**: see ORIGIN *versus* NATURE.

Return (economic) [Lat. *re* + *tornare*, to turn]: Ger. *Ertrag*; Fr. *produit*; Ital. *risultato, prodotto*. Price considered as a function of the form: cost ± net profit.

Return would ordinarily be measured in the form of total price received, rather than of price per unit of product.

Any productive process begins with the consumption in one form or another of a certain amount of capital, and ends with the production of an uncertain amount of new wealth. From the private standpoint, the capital consumed or invested represents an expense, and the resulting wealth sold takes the form of a money return. From the public standpoint, the amount of capital consumed is properly measured as waste, and the wealth produced takes the form of a return in means of public enjoyment which may more than replace the original amount wasted or sunk in the process. (A.T.H.)

Reuchlin, Johann. (1455–1522.) Educated in the chapel of the margrave of Baden, and at Paris and Orleans (law). Lectured on jurisprudence and belles-lettres at Tübingen, 1481, receiving the title of imperial councillor from the emperor; lived at the court of the elector palatine of Heidelberg, 1492–6; went to Rome, 1498, and became president of the Swabian confederate tribunal upon his return; professor at Ingolstadt, 1520.

Revelation (in theology) [Lat. *revelatio*, from *revelare*, to reveal]: Ger. *Offenbarung*; Fr. *révélation*; Ital. *rivelazione*. Any self-manifestation of the deity through natural or supernatural agencies. Especially: the communication of the divine thought or will through inspired human agencies; also the subject-matter thus communicated.

All religions presuppose some method of communicating the divine will to man. The term revelation acquires a specific import, however, in connection with the documents of religion. The sacred scriptures of any religion are the inspired basis of its doctrine and claims, and the question of the nature and import of revelation becomes one of great moment. In general it may be said that our estimate of revelation will depend upon our theory of inspiration.

Literature: see INSPIRATION; LÜCKE, Versuch einer vollständigen Einleitung in die Offenbarung (2nd ed., 1852); also the various New Testament Introductions. (A.T.O.)

Revenge [Lat. *re* + *vindicare*, to claim, through Fr.]: Ger. *Rache*; Fr. *vengeance*; Ital. *vendetta*. The emotion whose impulse prompts to return ill for ill: applied also to the ill which is returned.

Revenge has close affiliation with the other destructive emotions—anger, hate, malice. Its differentia seems to be the sense of owed and deserved ill to which the wrongdoer has made himself liable. It has a more organic instinctive form in the animals. In primitive societies it is not only measure for measure, but kind for kind—'an eye for an eye and a tooth for a tooth,' as well as 'a life for a life.' It is often made the germ from which social and statutory JUSTICE (q. v.) develops. The returning of good for good has no correspondingly urgent emotion, the feeling of gratitude being a tame and colourless affair compared with that of revenge. It illustrates —what is to be noted in other instances— that the unpleasant emotional states and

reactions are more developed, both as specific qualities and as having names, than the pleasant emotional states; e. g. there is no word for the opposite of jealousy, and no well-marked emotion of pleasure of such a type.

Literature: Revenge has had little special treatment; it is spoken of in passing in many of the treatises on EMOTION (q. v.). See also under JUSTICE. (J.M.B.)

Reverence [Lat. *revereri*, to be in awe, through Fr.]: Ger. *Achtung* (respect), *Ehrfurcht*; Fr. *respect* (respect), *révérence*; Ital. *riverenza*. (1) 'The feeling which accompanies the recognition of superiority or worth in others' (Sidgwick); disinterested RESPECT (q. v.) directed towards what is spiritually elevated and ideal.

> Thee I revere for what thou art,
> Nor fear for what thou hast,
> Still undiscovered by me, in heart
> And will. Reveal thy cast
> Of soul more fully—still 'tis fast
> I feel but reverence.
>
> Thee I revere, unseen the fact
> That moves thee for the day—
> Unknown the motive to the act
> That helps or hurts! But stay,
> But go, our friendship by the way—
> Still thee I reverence!

(J.M.B.)

(2) Kant so denominates the feeling which is aroused in a rational being by the contemplation of the moral law in its purity, or apart from inclination and self-interest.

As it is 'self-wrought by a rational concept,' this feeling is specifically different from all other feelings which arise from inclination and fear: it 'merely signifies the consciousness that my will is subordinate to a law.' 'Respect is properly the conception of a worth which thwarts my self-love.' See Kant, *Grundlegung z. Met. d. Sitten*, 22, note; Eng. trans. (Abbott), 17, note. Cf. RELIGION (psychology of). (J.S.)

Reversion (in biology) [Lat. *revertere*, to turn back]: Ger. *Rückschlag*, *Reversion*; Fr. *réversion*; Ital. *sopravvivenza*, *reversione*. ATAVISM (q. v.).

Literature: see ATAVISM. Important late titles are PEARSON, Grammar of Science (2nd ed.), and Proc. Roy. Soc. London, lxvi. (1900) 140. (J.M.B.)

Revery [Fr. *rêver*, to dream]: Ger. *Reverie*, *Träumerei*; Fr. *rêverie*; Ital. *reverie*. Somewhat continued dwelling upon a train of recollections, usually from an emotional motive.

Revery differs from day-dreaming in that the latter constructs situations of an agreeable and extravagant kind—'castles in Spain'—while revery selects trains of agreeable or emotionally toned recollections of real situations. (J.M.B.)

Revival (or **Recall**) (psychic or mental) [Lat. *re* + *vivere*, to live]: Ger. *Wiederaufleben* (*in der Erinnerung*); Fr. *réveil*, *rappel*; Ital. *reviviscenza*. The recurrence of a psychic state together with the identification of it as belonging to earlier experience.

The term includes the phenomena of MEMORY (q. v.), both voluntary (recollection) and spontaneous, and also those of EVOCATION (q. v.), i. e. the bringing up of images by suggestion; but it is narrower than mere REPRODUCTION (q. v.), since it involves the identification or RECOGNITION (q. v.) of the state revived. The noun recall is little used and is not needed; the use of recall as a verb is for a voluntary act of recollection.

This definition is made broad in order to allow for the differences of theory as to the nature of revival. The older and still very current theory holds that only images, cognitive states, are capable of revival, affective and conative experiences being revivable only as they are themselves first made objects of cognition. On this view only a certain kind of mental states, i. e. images, would fall under the definition. The opposed theory, of which that of 'affective memory' is the principal form, holds that this reduction of other states to cognitions is not necessary, since they can be directly revived as such. Upon this latter position depends the possibility of an 'emotional or affective logic,' which proceeds upon the abstraction and generalization of affective states together with certain aesthetic theories (cf. SENTIMENT, aesthetic). The definition leaves open this possibility.

Literature: that of MEMORY (q.v.) generally; see also the other topics referred to. On the revival of affective states see RIBOT, L'Imagination créatrice (with references to earlier papers by the same writer); PILLON, Rev. Philos., Feb. 1901; MAUXION, ibid., Feb. 1901; WITASEK, Zeitsch. f. Psychol., xxv; URBAN, Psychol. Rev., May, 1901, 262; July (especially), 1901, 360, 432 (critical articles with citations).

(J.M.B., G.F.S.)

Reward: Ger. *Belohnung*; Fr. *récompense*; Ital. *compenso*. See SANCTION, and cf. PUNISHMENT.

Reward (in theology) [OF. *rewarder*, an older form of *regarder*, to notice or heed]: Ger. *Vergeltung*; Fr. *rétribution*; Ital. *ricompensa*. The award of good or evil which the

soul receives after death on account of the deeds of the present life.

In the Hindu religion the reward is involved in Karma and the process of transmigration, and is evil rather than good. In Judaism and Mohammedanism the reward is good or evil as the divine grace may determine in view of the deeds of the present life. In Christianity the atonement of Christ makes it possible for every soul to escape Karma and attain the reward of good, evil being the lot of the finally impenitent only. (A.T.O.)

Rhetoric [Gr. *ῥητορική*, from *ῥήτωρ*, public speaker]: Ger. *Rhetorik*, *Redekunst*; Fr. *rhétorique*; Ital. *rettorica*. The art of correct and effective discourse.

The Greeks, who more than any other people conceived of language as a plastic material of art, developed this art under an aesthetic instinct, though with a practical purpose. The purpose was to persuade, but to persuade through satisfaction of the sense for harmony in language as the direct exponent of life and personality. (B.I.W.)

Rhythm [Gr. *ῥυθμός*, measured motion]: Ger. *Rhythmus*; Fr. *rhythme*; Ital. *ritmo*. A repeating series of time intervals; events which occur in such a series are said to have rhythm. (J.M.B.)

Its stimulus is a succession of impressions (tactual and auditory are most favourable) which either vary regularly in objective intensity or are variously emphasized at recurrent intervals by the perceiving subject ('subjective accentuation'). The limits of the rhythmical 'unit' and the most favourable intervals between impression and impression (or maximal intensity and maximal intensity) have been made out. No general theory has as yet been proposed; but the available material has been collected in a monograph by E. Meumann, 'Untersuch. z. Psychol. u. Aesth. d. Rhythmus,' *Philos. Stud.*, x. 249 ff., 393 ff. (E.B.T.)

Literature: the citations above; see also the Psychol. Index, i. ff. 'Movement,' and the next topic.

Rhythm (aesthetic). (1) Primarily, the periodic recurrence of stress, emphasis, or accent in the movements of dancing, the sounds of music, and the language of poetry. Applied also, in music and poetry (both inclusive and exclusive of the previous usage), to the relations of time and quantity, represented by measure and metre. The term is loosely employed in connection with prose.

(2) Applied secondarily and somewhat metaphorically to the relatively regular recurrence of the same or similar features in architecture, drawing, and painting. In this sense closely related to Symmetry, and Proportion (q. v.).

Rhythm is historically one of the earliest factors employed in the production of aesthetic effects. It appears as fundamental in the primitive development of dancing, music, and poetry. The evolution of poetry and music into independent arts has been accompanied by a distinct decrease in the relative importance attaching to rhythm, as compared with the other elements from which these arts derive their aesthetic values. In aesthetic theory, rhythm has played an equally conspicuous part, and has, with its related categories, harmony, proportion, and symmetry, been universally recognized by aestheticians who deal at all with the formal elements of beauty. Its agreeable effect has been explained, in part at least, by reference (1) to its physiological basis (Marshall) as involving recurrent activities of organs refreshed by immediately preceding periods of repose (after the analogy of muscular fatigue and recuperation), organic activities under such conditions being highly efficient and pleasurable; also by reference to the heightened sense of expansion and life, which connects itself with the augmentation of muscular movements, induced by the more extensive nervous discharges following rhythmic stimulation (thus Gurney, who also recognizes the other physiological and psychological explanations here mentioned); (2) by reference to its psychological basis, as involving the arousal and subsequent satisfaction of expectation (Allen); and (3) by reference to its cosmological basis, as representing, like harmony, symmetry, and proportion, the definite order to which the cosmos is attuned, and in which, therefore, the organism, like all other cosmic elements, finds its own, and to which in consequence it most naturally and effectively responds (Aristotle).

Literature: Köstlin, Aesth. (1869); Gurney, Power of Sound (1880); Wallaschek, Primitive Music (1893); Grosse, Beginnings of Art (1897). On wider sociological phases of rhythm and their connection with aesthetic processes see Bücher, Arbeit und Rhythmus (1896); Sauriau, L'Esthétique de Mouvement (1889). (J.R.A.)

Richard of St. Victor. Died 1173. Educated by Hugo of St. Victor, and became an intimate friend of St. Bernard. Sub-prior of the convent of St. Victor, 1159; prior, 1162–73.

Right [AS. *riht*, Lat. *rectus*]: Ger. *Recht*; Fr. *droit*; Ital. *dritto, diritto* (a right). (1) A right action, intention, motive, or attitude is one which fulfils or conforms to DUTY (q. v.). (J.S.–J.M.B.)

The intuitionists have regarded the 'right' as an ultimate ethical category, while the hedonists have explained it as simply the means to the 'good.' The Greek moralists generally followed the latter course, if they did not substitute the notion of 'good' for that of 'right.'

(2) A 'right' is the correlate of a duty; e.g. it is the duty of a child to obey his parents, and his parents have a right to his obedience. Besides moral and 'natural' rights, there are legal rights; and the relation of the latter to the former has been a subject of much controversy in both moral and political science. Cf. RIGHT (in law), STATE (philosophy of), and NATURAL RIGHTS.

(3) The term is used in German to denote the general system of rights and obligations, especially as capable of being enforced by law. Right in this juridical sense is called by Hegel 'abstract right,' and is for him the first and most external stage of the ethical process which, as a whole, is the subject-matter of Rechtsphilosophie. Cf. STATE (philosophy of).

Rightness is the quality by virtue of which anything is right (in any of the senses given). For the distinction between material and FORMAL RIGHTNESS, see the latter topic.

Literature: works on ethics; RITCHIE, Natural Rights. See also the topics mentioned. (J.S.)

Right (in law). (1) A legal power of one person over another; 'a capacity residing in one man of controlling, with the assent and assistance of the state, the actions of others' (Holland, *Jurisprudence*, chap. vii. 71).

(2) The aggregate of the principles by which rights (sense 1) are determined; the science of rights (Smith, *Right and Law*, §§ 228, 244).

No right can exist in one person without a correlative duty on the part of another or others. *Relative rights* are those involving duties of particular persons; *absolute rights*, those involving duties on the part of all other persons, as the right to life, liberty, and property. My right to my house in my possession is a *real right*: it attaches to the thing (*res*) against all the world. If I am wrongfully dispossessed, I have a *personal right* to recover possession from the wrongdoer in a real action. *Vested rights*: those already existing in a certain person, as owner, whether absolute or defeasible.

Ius, Recht, droit, diritto may signify either right or a right. 'To express the distinction between "law" and "a right," the Germans are therefore obliged to resort to such phrases as "objectives" and "subjectives Recht"; meaning by the former, law in the abstract, and by the latter, a concrete' right' (Holland, *Jurisprudence*, chap. vii. 72).

'Right' or abstract law, in the views of the historical school of jurisprudence, as expounded by Savigny, is no absolute, universal, and immutable rule, but one of the forces of society with which it changes, in accordance with fixed laws of development. Cf. STATE (philosophy of).

Literature: for an exposition of the moral theory of legal rights, see SMITH, Crit. Hist. of Mod. Eng. Jurisprudence, chap. viii; and for an elaborate discussion of civil rights, WOOLSEY, Polit. Sci., i. Pt. I; BOSANQUET, Philos. Theory of the State; RATTO, Sociologia e Filosofia del Diritto, chap. v ff. (1894); FILOMUSI-GUELFI, Del Concetto del Diritto, &c. (1874); MIRAGLIO, Filosofia del Diritto. (S.E.B.)

Right and Wrong Cases (method of): see PSYCHOPHYSICAL METHODS.

Righteousness [Gr. *δικαιοσύνη*]: Ger. *Rechtlichkeit, Gerechtigkeit*; Fr. *justice*; Ital. *giustizia*. (1) Disposition to observe law and to aid its enforcement.

Righteousness becomes legalism when it attaches importance to the letter and form of law as positively enacted. Cf. JUSTICE. (J.M.B.)

(2) Plato's term for the most fundamental of the four cardinal virtues, the presupposition of all the others. It is sometimes translated 'justice.' He defines it as the doing of its own proper work by each part of the soul, and by each class in the state. The state is righteous when the legislators legislate wisely, when the auxiliaries enforce this legislation, and when the subject class obeys; the soul is righteous when reason plans its good, when 'spirit' (*θυμός*) keeps the appetitive element (*τὸ ἐπιθυμητικόν*) in subjection to reason's law, and when appetite obeys (*Republic*, iv. 433–43). Aristotle distinguishes two main senses of the term, a wider and a narrower: (1) obedience to law, synonymous with complete virtue; (2) fairness or equality (*Eth. Nic.*, v. 1). (J.S.)

Righteousness (in theology) [AS. *rihtwisnes*, righteousness]: Ger. *Gerech-*

tigkeit; Fr. *justice*; Ital. *giustificazione*. (1) The righteousness of Christ, the merit purchased by Christ's obedience which may be imputed to the sinner as the ground of his justification. (2) Righteousness of the creature, the state of conformity to the divine law and of acceptance with God: more specially, the state of the sinner to whom the merit of Christ's obedience has been imputed and appropriated through repentance and faith.

Literature: A. RITSCHL, Die christliche Lehre v. Rechtfertigung, &c. (1870–4; Eng. trans. of vol. i, Edinburgh, 1872); theologies of HODGE, SHEDD, VAN OSTERZEE, DORNER. (A.T.O.)

Right-handedness: Ger. *Rechtshändigkeit*; Fr. *dextralité*; Ital. *destrismo*: see DEXTRALITY.

Rightness: see RIGHT (ad fin.).

Right Reason: trans. of the Gr. *ὀρθὸς λόγος* (Lat. *recta ratio*). Used by Aristotle (*Eth. Nic.*, vi. 13, 1144 b 23) for moral or PRACTICAL REASON (q. v.). For other usages see Eisler, *Wörterb. d. philos. Begriffe*, 'Orthos Logos.' Cf. Logos under REASON. (J.M.B.)

Rights (philosophy of): see STATE (philosophy of).

Rigorists (-ism): Ger. *Rigoristen* (*-ismus*); Fr. *rigoristes* (*-isme*); Ital. *rigoristi* (*-ismo*). Rigorism is a term used by Kant in a special sense—and sometimes used by later writers in a wider sense—to signify an ascetic or anti-hedonistic point of view in ethics.

In the wider sense, Kant himself would be included, with the Stoics, in the school of rigorists.

'It is in general important for ethics,' says Kant, 'to admit, as far as possible, no intermediates, either in actions (*adiaphora*) or in human characters. . . . Those who are attached to this strict view are commonly called rigorists (a name that is meant as a reproach, but which is really praise); and their antipodes may be called latitudinarians. The latter are either latitudinarians of neutrality, who may be called indifferentists, or of compromise, who may be called syncretists' (*Die Religion innerhalb d. Grenzen d. blossen Vernunft*, 23, 24; Eng. trans. (Abbott), 329). (J.S.)

Rigour [Lat. *rigor*, stiffness]: Ger. *Starrheit, Totenstarre* (rigor mortis); Fr. *rigidité*; Ital. *rigidità*. A stiffening of the tissues (generally applied to muscles) due to coagulation of their fluid or semi-fluid protoplasms, which occurs after death (*rigor mortis*, or cadaveric rigidity) or upon heating (*rigor caloris*, or heat stiffening).

Rigor mortis occurs in warm-blooded animals and in man in from ten minutes to seven hours after death, and may last from one to six days. Heat is given off in the process; and since different muscles contract at somewhat different periods, movements may occur which give rise to the notion that the body may have moved, or is still alive. Under exhausting disease, especially of the brain and spinal cord, in conditions of extreme fatigue, rigor mortis may occur so quickly as to catch the body in its last living attitude. This is known as 'cataleptic rigour.' (C.F.H.)

Ritschl, Albrecht. (1822–89.) Studied at Bonn and at Halle. Became Privatdocent, and later professor of theology, at Bonn, 1846–64; at Göttingen, 1864–89. He adhered to the Tübingen school until 1857, when he left it. Cf. RITSCHLIANISM.

Ritschlianism: Ger. *Lehre von Ritschl*; Fr. *doctrine de Ritschl, Ritschlianisme*; Ital. *dottrina di Ritschl*. The principles of the school of Ritschl, which represents, negatively, opposition to dogmatism and rationalism in religion, while positively it builds on the personal experience and person of the historic Christ as the subjective and objective sources of religious truth.

The Ritschlians seek to divorce theology from speculation by denying the validity of all judgments in the religious sphere except judgments of value. They also reject dogmatic Christianity with its presupposition of the supernatural, and seek in the person of Christ as an historic phenomenon the source of objective revelatory truth. The words and deeds of Christ and dogmatic statements about them are of secondary importance. The person of Christ as a persistent objective fact, in articulate union with the subjective religious consciousness, is the fountain of all religious truth and knowledge.

Literature: RITSCHL, Rechtfertigung u. Versöhnung (3rd ed., 1888), and Theol. u. Met. (2nd ed., 1887); HERMANN, The Communion of the Christian with God; STÄHLIN, Kant, Lotze u. Ritschl. (A.T.O.)

Ritter, Heinrich. (1791–1869.) Educated in theology and philosophy at Halle, Göttingen, and Berlin. Professor of philosophy at Berlin, 1824; at Kiel, 1833; and in Göttingen, 1837–69. His *History of Philosophy*, in twelve volumes, is his greatest work.

Ritual [Lat. *ritualis*, from *ritus*, a rite]:

Ger. *Ritual*; Fr. *rituel*; Ital. *rituale*. A body of prescribed forms for conducting religious rites, ceremonies, and worship.

In the broad sense ritual includes any prescribed form, whether the words be dictated or not. Strictly, ritual and liturgy are employed as equivalent terms. The Protestant churches have tended as a rule to simplicity of ritual in contrast to the elaborate forms of the Roman Catholic communion. There sprang up towards the end of the 19th century, however, an important movement in the Anglican communion in the direction of a more elaborate ritual.

Literature: see TRACTARIANISM. (A.T.O.)

Rivalry [Lat. *rivalis*, pertaining to a river]: Ger. *Wettstreit*; Fr. *rivalité*; Ital. *rivalità*. Of the three forms of rivalry distinguished below, COMPETITION (q.v.) and struggle for EXISTENCE (q.v.) are defined under those topics. The third, personal rivalry, is the relation between two persons, or more, which arises from their mutual intention or effort to excel each other in attaining an end which they have in common.

There are three great cases of rivalry which it is essential to distinguish, especially in view of current confusions arising from lack of discrimination: (1) biological rivalry, or struggle for existence; (2) personal or conscious rivalry or emulation, to which the term rivalry is more generally restricted; and (3) commercial and industrial rivalry, or competition.

(1) The forms of struggle for existence are pointed out under that term: the essentials of biological rivalry are survival, with subsequent production of offspring by and with physical heredity. No use of this form of rivalry by analogy to or from other forms is legitimate which does not recognize this fact of physical reproduction. Without this there is no *effective* biological rivalry.

(2) In personal rivalry we have all forms of individual competition for personal pleasure, profit, gain, victory, &c. It is, so far as the actual contest goes, the same as the second form of struggle for EXISTENCE (q.v., 2); but it is narrower, since it includes only those cases in which the individuals are directly and consciously exerting themselves against each other. It is a psychological fact, never a purely biological one. Cf. EMULATION.

The psychological factors involved include: (*a*) the particular impulse appealed to in exciting the effort: whether 'desire of being a cause' (Groos), called in the older English literature 'love of power'; desire to gain advantage—pleasure, reward, gratified pride, &c.—the older 'love of gain'; intellectual exercise—PLAY (q.v.) of the faculties; or other. All of these enter in cases of personal rivalry; and in adult life probably also in many instances reflective motives, such as pure love of success, love of the game as such, and malice towards and jealousy of competitors. (*b*) The psychological requisites of the *personal-rivalry-situation* as a whole. These are those of the social bond, in which the self and the other (ego and alter) are held in a common network of social relationships within which the contest takes place, and by which its rules and conditions are prescribed. This, it is well to note, involves as much co-operation as competition. The rivalry is never entirely rivalry, and it could not be rivalry at all but for the great mass of co-operative thinking, feeling, and action which precedes and conditions it. In short, personal rivalry is an essentially co-operative thing: it is a social situation in which, it is true, the pole of self-emphasis, assertion, and even aggression is very prominent, but in which, nevertheless, it is only one pole of the play of elements which constitute the thought of self as a 'socius' or personal companion to others.

It is, therefore, sharply distinguished from biological struggle for existence. The latter is operative under the law of physical reproduction, guided by natural selection with reference to utility in a biological environment. This, on the contrary, is operative in a social environment where social tradition through imitation and invention are the conserving and ordering factors, where the environment is psychological and moral, and where the criterion of utility yields to that of individual choice, selection, reflection, and, it may be, caprice.

This is not to say, however, that personal rivalry may not be involved in biological survival. It is evident that the capacity for personal psychologically-motived struggle may be of critical utility to a species, and so its possessors may be 'naturally' selected. But true as that is, it still remains a case of biological rivalry, and is subject to its laws. The purely social rivalry, as such, remains a different phenomenon, and cannot be subsumed under the biological.

(3) Industrial and commercial COMPETITION is treated under that topic. Its relation to the two preceding forms of rivalry may, however, be briefly indicated.

Two typical forms of it should be distinguished: (*a*) competition of individuals, which we may call 'free' competition; and (2) competition of agencies either individuals or organizations, which we may call 'restricted' competition. This distinction is essential, for it indicates two types of competitive activity analogous respectively to 'personal' and 'biological' rivalry.

(*a*) Free competition, considered as a type operative in industrial and commercial affairs, leaves to the individual freedom of enterprise, initiative, and method of operation in his attempt to succeed. It is, therefore, psychologically motived, and rests directly upon the individual's capacity, temperament, and social feeling. The economic motive is tempered and modified by the individual's character, and varies all the way from pure egoism or love of gain to the most humane and social concern for others' welfare and success. It appears, therefore, that in free competition we have in operation the factors involved in personal rivalry, but directed to an economic end. This end or view gives to the agencies of production, trade, &c., a certain real disinterestedness which appears inhuman, and is often made the excuse for what is really so; but yet industrial organization in which free competition is the dominant form is a mode of social organization in which the factors involved are those essential to the maintenance of social life, and consistent with its other and more altruistic modes. Hence the growth, within the ordinary machinery of industrial economics, of various purely social and ethical features: humane labour laws, hygienic surroundings, libraries and reading-rooms, baths, lecture courses, lyceums, &c., not only permitted but provided by employers, together with such more intrinsic arrangements as profit-sharing, increasing wage, pensions, labour insurance, &c. In essentials, therefore, this form of competition *is* (not merely represents) personal rivalry inside the industrial world. It is not, *nor is it analogous to*, biological struggle for existence.

In another point commercial competition involves psychological factors; appeal is made to the desire and choice of the consumer—what is known as demand. This demand may be reached either by direct rivalry for the consumer's patronage, or indirectly through means which increase the use of certain articles, set the style, limit variety, &c. In these ways of directing, stimulating, and controlling demand, all the competitors may be alike benefited by the success of one. This is different from the use of brute force, and also from the division of a fixed amount of patronage or gain: these latter bring the usual methods of biological rivalry. Cf. Social Organization.

(*b*) The second form of economic rivalry—'restricted' competition—is a different matter. It arises when individuals band together, either voluntarily or under social compulsion or persuasion, to pursue common economic ends in association. This gives to the group economic standing as an *agency*; and the members cease to act as individuals. The result is the formulation of purely economic rules of procedure—of defence and offence—and the elimination of individual temper, judgment, and sense of personal and social responsibility.

The direct result is that such a society becomes a *group*, and when engaged in competition with other groups, gives the phenomenon of Group Selection (q. v.); yet it is group selection, in the strict biological sense, only in part. As to the struggle, strictly speaking, of group with group, it is struggle for existence in so far as it means elimination of some groups and survival of others. But its results are socially conserved and handed down, not passed on by physical reproduction and heredity. So the resemblance is still partly analogy. Even restricted competition is not a biological fact. Even its most iron-clad and 'inhuman' forms are intelligent; intelligence unmoved by feeling is its watchword. And its forms of rivalry are very largely those of one master intelligence pitted against another.

Yet in this phenomenon of restricted competition we have the nearest social approach to biological rivalry as such, and that in certain unaesthetic features in which economic utility is the controlling end, if not the only one. First among these is the opportunity it affords of subordinating and destroying normal personal competition with its natural control by social and moral sentiment. Second, follows, to take the place of these controls, the need of state control: there would seem to be no other alternative. Third, we find not only group competing with group, but class organizations arrayed against each other, when the closest co-operation is essential even for the purest economical utilities; as of labour organizations against capital, employed against employer. And fourth, all are contributory to the great damage done to society by the

interference with personal liberty of contract and choice of work under the oppressive sanctions of the organization, which claim to regulate economic conditions. In all these respects the industrial environment in which modern corporate agencies operate is analogous to the biological: for utility is the criterion of survival, and economic utility is in many respects analogous to biological. See UTILITY.

The contrasts presented by these three sorts of rivalry are sharply brought out when we ask what forms of co-operation of individuals they severally involve. So far as co-operation enters into biological struggle for existence, it is instinctive and unreflective: as the gregarious and mass actions of herds or other companies of animals. It is a phenomenon of a biological sort produced by the operation of natural selection. Intelligent co-operation, to be available in the struggle, must be not for its direct results, but as representing a type of individual which it is of utility to preserve by the laws of heredity.

In personal rivalry, and with it free economic competition, we have the intelligent and reflective co-operation which illustrates the presence of a social and moral self in some degree of development.

In 'restricted' competition we revert to the formula which makes economic utility paramount, and only that form of co-operation possible which subserves it. This may arise among individuals within the group so far as it renders the group as such more efficient as against others, and also as between different groups or agencies for the ends of common utility.

Literature: see EXISTENCE (struggle for), and COMPETITION (especially title by EFFERZ); also ELY, Competition, Pres. Addr. Amer. Econ. Assoc., December, 1900. Cf. SOCIAL ORGANIZATION. (J.M.B., F.H.G., A.T.H.)

Rochow, Friedrich Eberhard von. (1734–1805.) Feudal superior of Rekahn, patron of the bishopric of Halberstadt.

Roman Law: Ger. *römisches Recht*; Fr. *droit romain*; Ital. *diritto romano.* (1) The law of Rome as it existed from time to time, throughout its history, until the fall of the Eastern empire.

(2) The law of Rome as codified under Justinian. See CODE.

The gradual growth and development of Roman law is sketched in the *Digest*, i. 2, *de origine iuris*, &c. It found its first definite written expression in the Twelve Tables ('XII'), promulgated in the 5th century B. C. Upon these a system of jurisprudence was built up, mainly by the efforts of private jurisconsults, whose opinions and treatises were from time to time adopted as rules of decision by the praetors in their annual edicts. This praetorian law was in the early empire put into the form of a perpetual edict. It was the principal part of the *ius honorarium*, which applied the principles of equity and natural justice in softening the rigour and formality of the earlier law (*ius civile*). It was largely in the form of a law regulating civil actions, the nature of the remedy really defining or creating the legal right. Then came the Theodosian Code (5th century of our era), and the *Corpus Iuris Civilis* of Justinian in the following century, the latter putting Roman law into a shape convenient both for students and practitioners. After the division of the empire, the Roman law long remained in the West the personal law for the Romans, even when the barbarians held rule. In the East (where Justinian reigned) it became overlaid by new imperial constitutions, and obscured by Greek commentaries, but was partly restored by an official code known as the *Basilica*, promulgated in A. D. 887. No trace of it remains in Turkey, but the Basilica have had great influence in shaping the legal conceptions of modern Greece. Roman law is the foundation of the jurisprudence of Central and Southern Europe, England and Ireland excepted.

Literature: SAVIGNY, Gesch. d. römischen Rechts im Mittelalter, and Syst. d. heutigen römischen Rechts; GIBBON, Decline and Fall of the Roman Empire, chap. xliv; HUGO, Hist. de Droit romain; IHERING, Geist d. römischen Rechts; CUQ, Inst. juridiques des Romains; SOHM, Inst. of Roman Law. (S.E.B.)

Romanes, George John. (1848–94.) Educated at Cambridge, England; fellow of the Royal Society, 1879; became an intimate friend of Charles Darwin; Fullerian professor of physiology, Royal Institute of London; Rosebery lecturer on natural history in the University of Edinburgh. He founded the Romanes Lecture at Oxford. He wrote chiefly in general biology and genetic psychology.

Romanism and Roman Catholic Church: Ger. *Dogmen der katholischen Kirche*; Fr. *Romanisme, Église catholique romaine*; Ital. *religione cattolica apostolica romana.* The system of doctrines and polity of the Roman Catholic Church. The Roman Catholic Church is that ecclesiastical body

which has its historic centre in Rome and its supreme power vested in a Sovereign Pontiff, who claims to derive his authority directly from St. Peter; as such it is called 'the Papacy.'

The most distinctive features are the papacy proper and the degree to which the individual is subordinated to the organic will of the Church in matters of belief and judgment. Reformed Christianity rejects the Roman hierarchy and recognizes a larger sphere of freedom for individual belief and judgment. See Roman Catholic Church Philosophy, under St. Thomas (philosophy of).

Literature: C. F. B. Allnutt, Cathedra Petri (2nd ed., 1878); A. Harnack, Dogmengeschichte (2nd ed., 1888); Rudolph Sohm, Kirchenrecht (Leipzig, 1892), i. (A.T.O.)

Romantic [Fr. *romantique*, from *romaunt*, a romance, so named because early romances were written in the Romance dialect]: Ger. *romantisch*; Fr. *romantique*; Ital. *romantico*. (1) Having the characteristics of a mediaeval romance, i. e. marked by freedom of fancy in conception and form, and having for content deeds of adventure, or the expression of love or religious devotion.

(2) As given a more general application, and related to Fichte's doctrine of the Ego as supreme principle, romantic was set over against classic by the Schlegels and others. (*a*) Classic stands for the objective, for conformity to such laws as clearness, truth, unity. Romantic is subjective, 'the will or caprice of the poet admits no law above itself' (F. Schlegel). Fancy is unrestrained. (*b*) Classic emphasizes the Type (q. v.); romantic the individual and Characteristic (q. v.). (*c*) Classic prefers Repose (q. v.); romantic makes feeling and passion primary, prefers the vague, mystical, and obscure to the clear and distinct, and is opposed to any laws, social, political, or moral, which would limit feeling or its full enjoyment.

(3) With Hegel the terms classic and romantic were used in a sense similar to (2), but with less emphasis on the capricious element of feeling. Classic art is that in which the idea is embodied in exactly adequate form, giving the ideal; romantic art has a more inward content, and so transcends any effort to embody it completely in sensible form. The term is applied by Hegel to modern art in general. Painting, music, and poetry are the romantic art forms.

(4) Present usage makes the characteristic of the romantic, subjectivism, the embodiment of feeling, with more or less of the various sub-characteristics indicated under (2) above. 'Romanticism' is applied to varieties of this tendency, and to the Romantic movement and school (below).

Romantic movement. The movement of revolt against the modern classic (e. g. Pope in England, the French 17th and 18th century drama, &c.), beginning about the middle of the 18th century (Rousseau, Goethe, Byron, &c.), and including as later representatives Victor Hugo and Wagner.

Romantic school. A group of writers in Germany advocating the views of art and life indicated under (2). It included A. W. and F. Schlegel, Tieck, Novalis, Schleiermacher, and others.

Literature: J. H. Schlegel, Ueber den Begriff des Romantischen (Wertheim, 1878; Programm); Zimmermann, Aesth., ii. 89–101; Schasler, Gesch. d. Aesth., 777–826; Hegel, Aesth., ii. Th., 3. Absch.; Wallaschek, Aesth. d. Tonkunst, 282–9; Van Dyke, Princ. of Art, chap. v; Royce, Spirit of Mod. Philos., chap. vi; Carriere, Die Kunst in d. Kulturentwickelung, v; Brandes, Die Hauptströmungen in d. Litteratur (1892); Phelps, The Beginnings of the Romantic Movement (1893); Köstlin, Aesth., 170 f.; Beers, English Romanticism in the 18th Century (1899); T. Gautier, Hist. du Romantisme (3rd ed., 1877); Herford, The Age of Wordsworth (1897); Omond, The Romantic Triumph (1900); A. Biese, Die Entwickelung des Naturgefühls im Mittelalter u. i. d. Neuzeit (2nd ed., 1892); J. E. Spingarn, Hist. of Lit. Criticism in the Renaissance (1899); K. Francke, Social Forces in German Lit. (2nd ed., 1897). (J.H.T.)

Romanticism: see Romantic (2, and Romantic School).

Root (linguistic) [Icel. *rôt*]: Ger. *Wurzel*; Fr. *racine*; Ital. *radice*. That part of a word which remains after all the formative elements recognizable by grammatical analysis have been removed.

Such formative elements are prefixes, suffixes, and inflectional endings. This analysis is purely formal, serving merely the purposes of scientific convenience, and asserts nothing concerning the original independent identity of these elements. In the earlier history of Indo-European comparative grammar the dogma of original monosyllabic root-words was generally accepted, but the present tendency of the science is to see in the stems, rather than in the roots, the type of the

primitive word. The nomenclature 'root,' 'stem,' representing originally a crude translation from the German Wurzel, 'root of a tree,' Stamm, 'trunk of a tree,' has now lost its force even in German. (B.I.W.)

Roscelin (Roscellinus, Rousselin, Rucelinus). Born in Lower Brittany about the middle of the 11th century. Studied at Soissons and Rheims; attached to the cathedral of Chartres; canon of Compiègne. He is called the founder of nominalism, because of his lifelong defence of a tri-individual doctrine of the Trinity. He was opposed by Anselm. He recanted in 1092, but continued his teaching. A second council condemned his opinions (1094), and he fled to England. Forced to return to France later, he taught at Tours and Locmenach (where Abelard was his pupil). Lived as late as 1121. See SCHOLASTICISM.

Rosenkranz, Johann Karl Friedrich. (1805–79.) Studied philosophy in Berlin and in Halle. Professor of philosophy at Königsberg, 1833–79. The 'best representative' of the Hegelian centre.

Rotation (sensation of): Ger. *Drehungsempfindung*; Fr. *sensation de rotation*; Ital. *sensazione* (or *percezione*) *di rotazione.* Sensation from the rotation of the body.

Rotation may be perceived by the eye, or if the movement be fast enough, by the organ of the STATIC SENSE (q. v.). Functionally regarded, the sensation of DIZZINESS (q. v.) may be termed the 'sensation of rotation' (see SENSATION). A common illusion of rotation, known as Purkinje's dizziness, is due to involuntary movements of the eyes. See ILLUSIONS OF MOTION AND MOVEMENT.

Literature: SANFORD, Course in Exper. Psychol., expts. 47–50. (E.B.T.)

Rotation and **Rotation Table**: see LABORATORY AND APPARATUS, III. B, (*c*), (3).

Rothe, Richard. (1799–1867.) Studied theology and philosophy at Heidelberg and Berlin; preacher to the Prussian Embassy at Rome, 1823; professor at Wittenberg, 1828; at Heidelberg, 1837; at Bonn, 1849; again at Heidelberg, 1854, where he died. A follower of Hegel.

Roughness and **Smoothness**: Ger. (1) *Rauhempfindung* (and *Rauhigkeit*), *Glattempfindung* (and *Glätte*); Fr. (*sensation de*) (1) *rugueux* and (— *de*) *lisse, uni*, (2) *rude, inégal* and *égal*; Ital. (*sensazione di*) *ruvidità*, (— *di*) *liscio.* (1) Sensations of: the quality of CONTACT SENSATION (q. v.) arising from intermittent stimulation of the same skin-area, as from the unevennesses of an explored surface, is roughness; continuous contact with movement of stimulus, of skin, or of both, has the quality of smoothness.

The surface is the usual case, and so customary that other intermittent contacts which fulfil the conditions, and are not apprehended in other ways, create the illusion of an uneven, or even, surface.

(2) Of tones: when tones sounded together produce BEATS (q. v.) not sufficiently rapid in succession to give a BEAT TONE (q. v.), and not sufficiently slow to be separately heard, they are heard as 'roughness.' See Sanford, *Course in Exper. Psychol.*, 79 *a.* Tones from which beats are absent are sometimes called 'smooth.' (J.M.B., H.C.W.)

Rousseau, Jean Jacques. (1712–78.) Born at Geneva, he was placed about 1722 in the family of a clergyman, sent 1723 to a notary, and afterwards to an engraver. Sent by a Roman Catholic priest to Madame de Warens at Annecy, she became the important factor in his life, 1729–38. During this time he studied for the priesthood, tried to teach music, wandered about much, but always failed. Went to Paris, 1741; secretary of the French ambassador to Venice, 1743; quarrelled with him and returned to Paris, where he devoted himself to literature. In 1765 his *Émile* necessitated his flight to England. His mind seemed affected, and he fled back to France and wandered from place to place, thinking he was pursued. In 1770 he returned to Paris, earning a livelihood by copying music, as he had done in youth; moved to the estate of a friend near Paris, 1777, where he died. His *Contrat Social* supplied the positive tenets of the French Revolution. He has been a principal figure in social evolution, as well as in the philosophy of the STATE (q. v.) and of society.

Royalty (in economics) [Med. Lat. *regalitas*, an attribute of the crown]: Ger. *Urheberrecht*; Fr. *droit de copie*; Ital. *prerogativa reale.* A charge authorized by the sovereign for the right to reproduce an idea, whether embodied in a mechanical invention (patent right) or in a work of literature or art (copyright).

No man will take the lead in a hazardous experiment when those who follow him have practically equal gain in case it proves successful, while avoiding the chance of loss in case of failure. The patent right, by making the gain a permanent one, makes it worth while for the capitalist to develop a new process which would otherwise go untried.

The monopoly conferred by copyright is justified on similar grounds. The royalty is not intended to reward the inventor *as an inventor*, but to make it worth while to risk capital, or to spend time and thought, in order to render the invention or production available for the public. (A.T.H.)

Rüdiger, Andreas. (1673–1731.) Born at Rochlitz in Saxony, he studied theology and jurisprudence at Halle, where Thomasius influenced him. He practised medicine and held positions as professor of philosophy alternately at Halle and at Leipzig.

Rudiment [Lat. *rudimentum*]: Ger. (1) *Anlage*, (2) *Rudiment, Spur* (see VESTIGE); Fr. (1) *rudiment* (cf. ANLAGE), *ébauche*, (2) see VESTIGE; Ital. (1) *rudimento* (cf. ANLAGE), *abbozzo*, (2) see VESTIGE. (1) In embryology: the first accumulation of cells in the embryo recognizable as the commencement of a structure, organ, or part.

(2) In anatomy and phylogeny: an incompletely developed part, as regards usually both size and structure.

There has been much discussion on the use of rudiment in embryology. Three other equivalents of ANLAGE (q. v.) have been proposed, 'fundament' by E. L. Mark, 'proton' by B. G. Wilder, 'primordium' by A. Willey. Of these none has been commonly used. The word Anlage is now generally used by American embryologists, and is also met with in British authors. (C.S.M.)

As rudiment seems the best rendering for Anlage (a term upon which all the authorities of this work agree—except C.S.M., who prefers to use the German term—and which the French and Italian correspondents also recommend in their respective languages) it would seem best to adopt some other term (see VESTIGE) for the anatomical meaning (2). Cf. TERMINOLOGY, German, 'Anlage.' (J.M.B.)

Rudimentary (organs, &c.): see VESTIGIAL, and cf. RUDIMENT (2).

Ruin [Lat. *ruina*, from *ruere*, to tumble down]: Ger. *Verfall*; Fr. *ruine*; Ital. *ruina*. (1) Applied in theology to reprobation, damnation, punishment, &c., in the future life, whatever doctrinal form this may take on.

(2) In ethics it means confirmed moral disintegration and decay. Its connotation is not exact. (J.M.B.)

Rule [ME. *reule*, rule]: Ger. *Regel*; Fr. *règle*; Ital. *regola*. (1) A formula expressive of an approved mode of procedure. (C.S.P.–J.M.B.)

(2) A law pertaining to matters of detail, especially the conduct of business or of a game.

(3) A formula expressing what is permissible, and how it should be done, as the rules of algebra.

(4) Any universal proposition, especially the major premise of a direct syllogism.

Antepredicamental rule. One of two rules in the prefatory part of Aristotle's *Praedicamenta*. The first is in substance the *dictum de omni*, namely: 'When one thing is predicated of another as its subject, whatever is said of the predicate may also be said of the subject.' The other rule is: 'The differences of different genera and of things not subordinate one to another are different.'

Rule of philosophizing. One of four rules laid down by Sir Isaac Newton in the beginning of the third book of his *Philosophiae Naturalis Principia Mathematica*.

They are as follows:—

Rule I. As causes of natural phenomena (*rerum*) not more ought to be admitted than such as are at once true [whence the common phrase *vera causa*] and suffice to explain the observations.

Rule II. And therefore, for natural effects of the same class, the same causes are to be assigned, as far as may be.

Rule III. Physical characters which cannot be increased or diminished, and which belong to all bodies which it is possible to subject to experiment, should be held to be characters of all bodies.

Rule IV. In experimental science, propositions inferred by induction from observation ought to be held as true, whether exactly or approximately, without regard to contrary hypotheses, until new observations may correct them or establish exceptions to them.

The logical accuracy of these rules, especially of the last, is in contrast with the statements of many modern logicians. (C.S.P.)

Rule (ethical): Ger. *Regel, Norm*; Fr. *règle, norme*; Ital. *regola, norma*. (1) A specific practical precept, or maxim of conduct.

The mediaeval casuists tried to provide such specific rules for the direction of the individual conscience. Modern intuitionists have contented themselves with the discovery of general principles, leaving to the individual judgment the determination of their particular application. A recent classification and discussion of 'Rules of Conduct' is by Baldwin, *Social and Eth. Interpret.*, chap. xiv.

(2) Some of the earlier British moralists use the term as synonymous with STANDARD (q.v.), criterion, or norm. Butler says of man: 'He hath the rule of right within; what is wanting is only that he honestly attend to it' (*Sermons*, iii. § 3). Cf. CASUISTRY. (J.S.)

Rule (legal): see LAW.

Rule of Faith (in theology) [Lat. *regula fidei*]: Ger. *Glaubensverordnung*; Fr. *règle de foi*; Ital. *regola, norma di fede*. The sufficient and final standard for the determination of truth in matters of religious faith and doctrine.

A conflict arose in Judaism as to the rule of faith; one party ascribing absolute authority to the written Scripture alone, while the other admitted oral tradition to equal standing with the written word. The same issue has arisen in Christianity between the Reformed and the Roman Catholic churches; the former adhering to the Bible as the only standard, while the latter includes authorized tradition. (A.T.O.)

Ruskin, John. (1819–1900.) An English essayist and critic, born at London. Receiving his early education from private tutors, in 1836 he entered Christ Church, Oxford. The first volume of his *Modern Painters* appeared in 1843, and was at once effective in influencing English art and art criticism. Professor in the Cambridge School of Art in 1858, Rede lecturer at Cambridge, 1867; Slade professor of fine art at Oxford, 1869–79, and again, 1883–5. He established St. George's Gild in 1871. Died at his home, Brantwood, on Coniston Lake, in the Lake Country.

Ruysbroek, Johannes (also **Rusbrock, Rusbroch,** &c.). (1293–1381.) So called from the name of his native village Ruysbroek, near Brussels, he was (1317) priest and vicar of St. Gudule, Brussels. Retired to the Augustine monastery at Grünthal, 1353, where he became prior and died.

S

S (in logic). (1) In the mnemonic names of moods, s signifies that the proposition denoted by the preceding vowel is to be converted simply in reduction. See CONVERSION (in logic).

(2) Used for the subject of a proposition or the minor term of a syllogism. (C.S.P.)

σ [Gr. letter, sigma]. Symbol for ·001 sec. in experimental psychology. See REACTION TIME. (J.M.B.)

Sabbatarianism [Lat. *sabbatarius*, pertaining to the Sabbath]: Ger. *die Lehre der strengen Sabbaths-Beobachter*; Fr. *sabbatisme*; Ital. *sabatismo*. The doctrine that the obligation to observe the Christian Sabbath rests on the divine injunction as expressed in the fourth commandment.

The Sabbatarian rejects the view which would rest the obligation of the Sabbath on relative grounds and claims for it the absolute divine command. Associated with Sabbatarianism, but not necessarily involved in it, is the tendency to overstrictness in its observance. On the other hand, the rejection of Sabbatarian views is often accompanied with a tendency to extreme laxity in the observance of the day. (A.T.O.)

Sabellianism: Ger. *Sabellianismus*; Fr. *Sabellianisme*; Ital. *Sabellianismo*. A theory of the Godhead, named after its founder Sabellius, in which the divine nature is conceived to be unitary both in substance and personality, the Trinity arising as a threefold but temporary manifestation of God in his relation to creation and the redemption and sanctification of man.

Sabellianism arose as a reaction against polytheistic tendencies and moved in the direction of extreme Jewish monotheism. It asserts the essential oneness of the divine nature and person. The distinction into the trinadic manifestation is one of mode and not of nature. The Trinity is, therefore, a purely temporary manifestation, and disappears with the temporal death of Christ. The doctrine was condemned as a heresy at Alexandria in 261 A.D., but still survives as a tendency.

Literature: Schaff-Herzog's Cyc., art. Anti-Trinitarianism; M. J. ROUTH, Reliquiae Sacrae; SCHAFF, Hist. of the Christ. Church, ii. 580 f.; Church Hist., by MILMAN, MOSHEIM, &c. (A.T.O.)

Saccus: see AMMONIUS SACCUS, and ALEXANDRIAN SCHOOL.

Sacerdotalism [Lat. *sacerdotalis*, pertaining to the priest]: Ger. *Priesterwesen*; Fr. *sacerdotalisme*; Ital. *sacerdotalismo*. The theory that the characteristic functions of the minister of religion are sacrificial and priestly.

The sacerdotal character has been prominent in most religions in connection with the demand for propitiatory or expiatory sacrifice. In Christianity the great expiatory sacrifice has been made once for all by its Founder and great High Priest. The sacerdotal feature survives, especially in the Romish Church, in connection with the conception of the sacrament of the Eucharist as essentially a sacrifice requiring priestly mediation. Reformed Christianity rejects this sacrificial conception, and with it, to a great degree, the priestly conception of the minister of religion. (A.T.O.)

Sacrament [Lat. *sacramenta*, from *sacrare*, to dedicate]: Ger. *Sacrament*; Fr. *sacrement*; Ital. *sacramento*. A solemn rite of religion administered according to prescribed forms, which is supposed to carry with it the

divine sanction and to communicate needed grace to the believing recipient.

The sacrament is an incident of the sacrificial feature of religious worship, and varies with it. In Christianity it attains its maximum of importance and meaning in the Roman Catholic communion. Reformed Christianity tends to reduce the number as well as the importance of the sacraments relative to other features of worship.

Literature: Canons and Decrees of the Council of Trent; J. Ch. Augusti, Denkwürdigkeiten aus d. christl. Archaeologie (1827–31); Cheatham, Dict. Christ. Antiq. (1875–80). (A.T.O.)

Sacred Books: Ger. *heilige Schriften*; Fr. *livres saints*; Ital. *sacre scritture*. See Scriptures.

Sacrifice [Lat. *sacrificium*, an offering]: Ger. *Opfer*; Fr. *sacrifice*; Ital. *sacrificio*. An offering, consecrated and set apart for a religious purpose, which is solemnly offered according to prescribed forms to some object of worship as an act of propitiation, consecration, reconciliation, penitence, or thanksgiving.

For the sacrificial idea of Sacrament see that term; see also Atonement. Sacrifice is employed to designate any expiatory act or suffering, as the sacrifice of Christ. But it also includes acts of religious service and devotion, as the giving of alms and the sacrifice of a broken and contrite heart. In general, however, sacrifice in the religious sense is associated with solemn and ceremonial forms. (A.T.O.)

Sacrifice of Christ: see Atonement.

Sadduceeism [Heb. *Tsadok*, the Just One]: Ger. *die Lehre der Sadducäer*; Fr. *saducéisme*; Ital. *sadduceismo*. The doctrine of a school of Judaism (known as Sadducees) in the time of Christ who opposed the Pharisees in both religion and politics, rejecting the authority of the oral tradition and the ascetic formalism of the Pharisees, and favouring the introduction of foreign influences and ideas.

In modern times Sadduceeism has come to be a synonym for indifference in religion and the spirit of worldly compromise. The school or party no doubt originated among the Jews as a protest against the extreme rigidity of the Pharisees. It was at first distinctly religious, but in time was led to take a political attitude in opposition to the extreme conservatism of the Pharisees. In the time of Christ the dominating interests of the party were political rather than religious.

Literature: Wellhausen, Die Pharisaei und die Saducaei (1874). (A.T.O.)

Saisset, Émile Edmond. (1814–63.) Born at Montpellier, and educated in Paris under Cousin and Jouffroy, he taught philosophy at Cahors, Caen, and Paris. In 1856 he succeeded Damiron at Paris, and retained the chair until his own death. He belonged, with Cousin, to the French Eclectic school.

Salisbury, John of (Joannes Parvus, also **John of Chartres.** (cir. 1110–80). Named from his birthplace Salisbury, England, he was educated in France, where he became the zealous pupil of Abélard. Returned to England, his native land, 1148, and became intimate with Theobald and Thomas à Becket. Bishop of Chartres, 1176–80.

Saltation (in biology) [Lat. *saltare*, to jump]: Ger. *sprunghafte Entwickelung* (K.G.); Fr. *discontinuité, saccade, saut*; Ital. *evoluzione saltuaria* (or *a salti*). 'The phrase "evolution by saltation" has been used for the sudden appearance of divergent types, first used by W. H. Dall' (Hyatt, *Science*, Jan. 29, 1897, 170).

Similar conceptions are covered by the terms 'transilient' (Galton) and 'discontinuous' variation (Bateson), and Mutation (q. v.). (J.M.B.)

Saltus [Lat., a jump]: Ger. *Sprung*; Fr. *saut*; Ital. *salto*. (1) Saltus in concludendo: a paralogism which consists in proving something as an aid in proving something else and then supposing that something different has been proved. But by some writers a mere omission of an obvious step in a proof is called a saltus.

(2) A 'saltus in change' is defined by Kant as a passage from one state to another without passing through a continuous line of intermediate changes. (C.S.P.)

Salvation [Lat. *salvatio*, from *salvare*, to deliver]: Ger. *Erlösung*; Fr. *salut*; Ital. *salvazione, salute* (*dell' anima*). The deliverance which religion promises from the sins and sufferings and imperfections of the present life. See Soteriology.

In Christianity it is provided in the Christian scheme of redemption, and to a less degree in Buddhism in the ascetic discipline and the attainment of Nirvana.

Literature: see Soteriology, Buddhism, Nirvana, and Oriental Philosophy (India). (A.T.O.)

Same (the) and (the) **Other:** Ger. (*das*) *Gleiche und* (*das*) *Andere*; Fr. (*le*) *même et* (*le*) *différent*; Ital. (*il*) *medesimo e* (*l'*) *altro*. These terms, with sameness and otherness, are corre-

lates which have their technical meaning as translations of certain terms in the Platonic philosophy—being otherwise equivalent to the terms IDENTITY and DIFFERENCE, PERMANENCE and CHANGE (q. v.). Plato used the term *ταὐτότης* (*ταὐτόν*) for sameness.

Self-sameness is the characteristic sign of the Idea, the essential Being; while the material, having movement as its defining feature, is in continual change or process, a fact which is expressed by calling it the Other (*τὸ ἕτερον = θάτερον*). The Sophist (254–60) aims to show that logically the Same and the Other require each other; and thus to refute the Eleatic conception of pure Being. According to Timaeus (35–8, and 44), God made the soul (the World soul primarily) by taking the Same (which is indivisible and unchangeable) and mixing it with the Other (which is divisible and has to do with material things), and then mixing them both with existence. This mixture was then subdivided according to complicated mathematical principles; the various proportions and positions of the Same and the Other account for the peculiarities of the universe (e. g. the uniformity of the stellar heavens, and the regular irregularity of the planetary), and also for the possibilities of true knowledge and of certain belief. This identification of the logical principles of identity and difference with the cosmic principles of permanence and change, reinforced by mathematic speculation upon the ONE AND THE MANY (q. v.), had great influence upon the later Neo-Platonic theories of the constitution of the world. Hegel revived the conception of the Other (das Andere) as expressing the Non-Being, involved in every Somewhat (Etwas) or defined Being (Dasein), constituting its finitude and its intrinsic tendency to change (Veränderung). Thus nature is the other of spirit, and as such is otherness in itself and to itself, and thus a world of space and time (Hegel, *Werke*, iii. 115–8). (J.D.)

Sameness (consciousness of): see IDENTITY.

Sanchez, Francis. (1562–1632.) A Portuguese, educated at Bordeaux. Professor of medicine in Montpellier, 1584; of medicine and philosophy in Toulouse until his death. Like Montaigne and Charron he was a sceptic.

Sanctification [Lat. *sanctificatio*, from *sanctus*, holy, and *facere*, to make]: Ger. *Heiligung*; Fr. *sanctification*; Ital. *santificazione*. In Christian theology, the process by which the sinner who has repented and been justified through faith, is gradually purified from the corruption of sin and made holy.

Sanctification presupposes the atonement, and the repentance, faith, and justification of the sinner. It stands correlated with conversion, which is grace begun in the human heart; whereas sanctification is the process by which the work of grace is completed. The nature of sanctification is somewhat differently conceived by Protestants and Roman Catholics; the former distinguishing it more specifically from justification, and laying the greater emphasis on the agency of sovereign grace; the latter practically identifying justification and sanctification, and emphasizing more the penance and good works of the believer.

Literature: see THEOLOGY. (A.T.O.)

Sanction (ethical) [Lat. *sanctus*, sacred]: Ger. *Sanktion, Handlungsbegründung* (psychological—Barth); Fr. *sanction*; Ital. *sanzione*. Any influence, whether negative or positive, whether of the nature of punishment or of reward, which enforces the observance of the moral law, or stimulates to such observance. In general, however, as a result of juristic influence, the term has been largely restricted to its negative sense of punishment. Cf. DUTY.

The doctrine of moral sanctions is specially prominent in the Utilitarian school. Bentham regards pleasure and pain as not only final, but efficient causes. As efficient causes, or as capable of giving a binding force to any law or rule of conduct, pleasure and pain are termed sanctions. Bentham distinguishes four such sanctions: the physical, the political, the moral or popular, and the religious. According to J. S. Mill: 'The question is often asked, and properly so, in regard to any supposed moral standard: What is its sanction? What are the motives to obey it? Or more specifically: What is the source of its obligation? Whence does it derive its binding force?' Mill distinguishes the internal from the external sanctions. The latter are—'the hope of favour and the fear of displeasure from our fellow creatures or from the Ruler of the Universe, along with whatever we may have of sympathy or affection for them or of love and awe of him, inclining us to do his will independently of selfish consequences.' 'The internal sanction of duty, whatever our standard of duty may be, is one and the same—a feeling in our own mind, a pain, more or less intense, attendant on violation of duty, which, in properly cultivated moral natures, rises, in the more serious cases, into shrinking

from it as an impossibility: this feeling, when disinterested, and connecting itself with the pure idea of duty, . . . is the essence of Conscience. . . . Its binding force consists in the existence of a mass of feeling which must be broken through in order to do what violates our standard of right, and which, if we do nevertheless violate that standard, will probably have to be encountered afterwards in the form of remorse.' 'This basis of powerful natural sentiment' constitutes 'the strength of the Utilitarian morality. This firm foundation is that of the social feelings of mankind, the desire to be in unity with our fellow creatures.' Spencer follows Mill in differentiating the internal or properly moral control from the external or pre-moral controls which are preparatory to the moral, and from which the latter gradually frees itself. The moral control consists in the insight into the intrinsic superiority, as principles of conduct, of the more complex, representative, and later-evolved feelings to the simpler, presentative, and earlier-evolved. The sense of duty, so far as coercive, is the product of the pre-moral controls, and decreases with the increasing moralization of conduct.

Literature: Bentham, Introd. to Mor. and Legisl., chap. iii; Mill, Utilitarianism, chap. iii; Spencer, Princ. of Eth., Pt. I. chap. vii. (J.S.)

Sanction (legal). That by which a law is enforceable.

'The real meaning of all law is that, unless things proceed in the manner prescribed by it, the state will, either of its own accord or if called upon, intervene. The intervention of the state is what is called the "sanction" of law' (Holland on *Jurisprudence*, chap. viii. 76). *Civil sanctions* are for the redress of civil injuries; *penal sanctions* are for punishing crime. A law without a sanction is imperfect (see Markby's *Elements of Law*, chap. xix). *Pragmatic sanctions*: in late Roman law, an imperial decree relating to the affairs of a community (*Cod. Theodos.*, xvi. 5, *de Haereticis*, 52); in modern law an ordinance by the sovereign authority concerning objects of the first importance as to the civil or ecclesiastical administration, especially that of Charles VII of France touching the liberties of the Gallican Church.

In early societies sanctions are of a moral character, coming from reverence for the gods, custom, and public opinion; or else arbitrary, coming from private vengeance or royal will (see Maine's *Early Hist. of Inst.*, lect. ii. 30). The idea of law probably precedes that of sanction. 'Law is enforced by the state because it is law: it is not law merely because the state enforces it' (Pollock on *Jurisprudence*, chap. i. 27). 'Sanctae quoque res, veluti muri et portae civitatis, quodammodo divini iuris sunt; et ideo nullius in bonis sunt. Ideo autem muros sanctos dicimus, quia poena capitis constituta est in eos qui aliquid in muros deliquerint. Ideo et legum eas partes, quibus poenas constituimus adversus eos qui contra leges fecerint, sanctiones vocamus' (*Inst. of Just.*, ii. 1, *de Rerum Divisione*, &c., 10). Yet there is difference of opinion as to this relation. See Punishment, and Justice. (S.E.B.)

Sanction (in psychology). Any ground or reason for action, whether or not the individual is conscious that this is his ground or reason. Cf. Sanction (ethical, legal, social).

It seems to be impossible in the present state of discussion to confine this term to negative reasons, in accordance with the legal usage whereby sanctions are mainly penalties and not rewards. Both psychologically and philosophically these two classes stand on the same plane with reference to the individual's action: both enter to influence him from the point of view of consequences. In law the distinction is of more or less importance, since by penalties more enforcement can be given to a command than by rewards; but when we consider that both enter as preliminary data, deterrents or inducements, into the actor's mental life, this difference is seen to be principally, if not only, one of degree. As a matter of fact, law has actually developed a system of punishments rather than one of rewards, probably under the necessities of compulsion, such as imprisonment, &c.

From the psychological point of view the important distinction is not that between deterrent and inducing sanctions, but between conscious and non-conscious sanctions; which means between the sanction as end, on the one hand, and as a lower form of motive on the other, the latter being, perhaps, an influence of the affective or suggestive order which the individual does not apprehend at all. Many of the most important of the social sanctions are of the last-named sort; e.g. public opinion, custom, style, crowd action, &c. The following classification of sanctions, mainly with reference to this type of social influences, has been drawn up by the present writer with

greater detail elsewhere (*Social and Eth. Interpret.*, chaps. ix, x):—

- Sanctions
  - 1. Personal (psychic)
    - S. of impulse.
    - Lower hedonic S.
    - S. of desire.
    - Higher hedonic S.
    - S. of right.
  - 2. Social (psychological)
    - Natural S.
    - Pedagogical and conventional S.
    - Civil S.
    - Ethical and religious S.

Following the distinction recommended elsewhere (see PSYCHIC OR MENTAL AND PSYCHOLOGICAL), group (1) of the table above may be called psychic or mental, in so far as the sanction as such enters into the mental state of the actor. In so far as not entering into the actor's mental state as conscious reasons or motives for action, but still being reasons for his action, the sanctions of group (2) are psychological, but not psychic. The particular cases may work from one group to the other, notably from group (2) to group (1).

Literature: titles given under the other topics SANCTION; AUSTIN, Province of Jurisprudence. More psychological are STEPHEN, Sci. of Eth., chap. iii; BAIN, Mor. Sci., chap. ii; BALDWIN (as cited above). (J.M.B., G.F.S.)

Sanction (social). Any means by which society induces the individual to act in accordance with the general will of the community.

Originally sanction was the act of making sacred; hence later, making sacred by binding, as by an oath; still later, making solemnly authoritative, as by a decree; and finally, the penalty attached by law to an illegal act. From this last conception we have the notion of the social sanction, i. e. any penalty which society attaches to conduct that public opinion or common sentiment condemns, or any reward or distinction that society confers for conduct generally approved. Strictly speaking, all legal sanctions are included in social sanctions, which comprehend not only ridicule, public blame and praise, socially conferred distinction or office, boycotting, but also such penalties as fines, imprisonment, and death inflicted by common consent and by concerted action, whether legally or illegally. Cf. the other topics SANCTION. (F.H.G.)

Sanguine [Med. Lat. *sanguinitas*, blood-relationship]: Ger. *sanguinisch*; Fr. *sanguin*; Ital. *sanguigno*. Of a hopeful TEMPERAMENT (q. v.). (J.J.)

Sanity (and **Sane**) [Lat. *sanitas*]: Ger. *Gesundheit* (*gesund*); Fr. *santé* (*sain*); Ital. *sanità*, *salute* (*sano*). Soundness of mind; the possession and control of normal mental faculties. Cf. INSANITY. (J.J.)

Sankhya Philosophy: see ORIENTAL PHILOSOPHY (India).

Satan [Heb. *Satan*, an enemy]: Ger. *Satan*; Fr. *Satan*; Ital. *Satana*. A name used in the Hebrew and Christian Scriptures for the great adversary who is represented as a fallen Archangel. See DEVIL.

Literature: CARUS, Hist. of the Devil (1901). See also DEVIL. (A.T.O.)

Satisfaction [Lat. *satis*, enough, + *facere*, to make]: Ger. *Befriedigung*; Fr. *satisfaction*; Ital. *soddisfazione*. Happiness arising from a conscious condition of wellbeing usually connected with the gratification of (i. e. the attainment of the end of) some particular sentiment.

So far as satisfaction is contrasted with happiness, it is (1) by limitation to the more settled or dispositional sources of pleasure. We get happiness from the gratification of lesser desires, but satisfaction from the consciousness of well-directed sentiments, such as friendship, intellectual endeavour, the successful issue of a thought-out plan, &c. We speak of ethical and aesthetic satisfactions where the term happiness would not be appropriate. (2) By the relative degree of conscious reflection or contemplation which is given to the pleasurable state and its object. A happiness may become a satisfaction or a gratification when we think upon it and remark its value to us. We take satisfaction in thinking upon situations which at the first gave us happiness. Gratification, as a term, is closely akin to satisfaction, having in it rather more emphasis on the first distinguishing mark noted above, and also more emphasis on the thought of self. This latter appears in the gratification of such emotions as pride, vanity, ambition, &c. (J.M.B.)

Butler speaks of 'happiness or satisfaction' (*Sermon*, xi. § 6). Hobbes, on the contrary, opposes happiness and satisfaction. 'The felicity of this life consisteth not in the repose of a mind satisfied. For there is no such *finis ultimus*, utmost aim, nor *summum bonum*, greatest good, as is spoken of in the books of the old moral philosophers. Nor can a man any more live, whose desires are at an end, than he whose senses and imaginations are at a stand. Felicity is a continual progress of the desire, from one object to another, the attaining of the former being

still but the way to the latter. The cause whereof is that the object of man's desire is not to enjoy once only and for one instant of time, but to assure for ever the way of his future desire' (*Leviathan*, chap. xi). Cf. Mill's distinction between happiness and contentment (*Utilitarianism*, chap. ii). The term is also sometimes used as equivalent to pleasure, or the constituent element of happiness. Shaftesbury, e. g., speaks of 'pleasures or satisfactions' (*Inquiry concerning Virtue*, Bk. II. Pt. II. § 1). Green and other Neo-Hegelians use the term 'self-satisfaction,' as well as 'self-realization,' to characterize the good—holding that the self is satisfied only by being realized. Cf. Green, *Prolegomena to Ethics*, Bk. III. chap. i, and Spinoza, *Ethica*, Pt. IV. prop. 52. (J.S.)

Satisfaction (aesthetic). (1) SATISFACTION (q.v.) in what is aesthetic.

(2) The term is specially connected with the principle of the 'satisfaction of expectancies,' in accordance with which an aesthetic content will be so constituted that its various parts lead naturally up to one another, as if in response to a definitely formulated expectation.

This phrase is Marshall's, who follows closely after Bergmann in his development of the idea borrowed from Schiller in connection with beauty of form.

Literature: BERGMANN, Ueber das Schöne (1887); MARSHALL, Aesth. Princ. (1895). (J.R.A.)

Saturation [Lat. *saturare*, to fill]: Ger. *Sättigung*; Fr. *saturation*; Ital. *saturazione*. The correlative term to purity of colour; the relative deficiency in black-white admixture in any colour sensation. (C.L.F.)

It is the third determinant of the total colour impression, besides colour tone and brightness. It is sometimes spoken of as the colour intensity of the 'colour.' Cf. Visual Sensation under VISION, and BRIGHTNESS. (E.B.T.)

Satyriasis: see NYMPHOMANIA.

Savage [Lat. *silvaticus*, belonging to a wood, through Fr.]: Ger. (*der*) *Wilde*; Fr. *sauvage*; Ital. *selvaggio* (man), *selvatico* (animals)—(E.M.) Pertaining to the lowest condition of normal human development.

Owing to the various connotations of a derogatory character which attach to the word savage, the term 'primitive man' is preferred by many writers; this includes as well the prehistoric races whose status must be inferred from their relics, as well as the crudely organized tribes visited by modern travellers.

Owing to the essential differences of habitat, race, endowment, &c., it is impossible to describe any group of mental qualities or of industrial and social status as characteristic of savages; but it may be said that their implements and industries are simple adaptations of natural materials; that the search for food, or the warfare with neighbouring tribes, occupies a prominent part of their occupation; that their moral and religious life is largely built up on animistic conceptions of the forces of nature; that their mental life is limited and monotonous, and their social organization crude and often conditioned by nomadic habits. It has been customary in comparative psychology to compare mental characteristics in the child with those of savages; the analogy is suggestive, but the difference in physical development between the two must not be lost sight of. It has been customary to contrast savagery with barbarism, and these with civilization. However useful in current speech, these distinctions of large and variable culture stages are too indefinite to be scientifically precise. Cf. CULTURE, RACE, and ANTHROPOLOGY. (J.J.)

Savart's Wheel: see LABORATORY AND APPARATUS, III, B, (*b*), (4).

Saving Faith: see FAITH for equivalents of that term. In Christian theology, that act on the part of the repentant sinner by means of which or in which the atoning grace of Jesus Christ is secured and appropriated and the sinner justified before God. Cf. FAITH. (A.T.O.)

Saviour [Lat. *salvator*, from *salvare*, to deliver]: Ger. *Heiland*; Fr. *Sauveur*; Ital. *Salvatore*. One who delivers or provides a way of deliverance from the evils and imperfections of the present existence.

In the broad sense, Zoroaster, Buddha, Mohammed were saviours, inasmuch as they were the authors of schemes of deliverance from the evils of life. But none of these claim to save by his own power. They either profess to be prophets of God, like Mohammed, or, like Buddha, point out the way which men must realize in their own strength. In Christianity, on the contrary, the Saviour also professes to be divine and to save by his own power; the Christ of Christianity not only points out the way, but promises divine help and grace in its realization. (A.T.O.)

Scent (or **Odour**) [Lat. *sentire*, to per-

ceive]: Ger. *Geruch*; Fr. *odeur*; Ital. *odore*. A specific sort or quality of SMELL SENSATION (q.v.). (J.M.B.)

Scepticism [Gr. σκέψις, doubt, hesitation, from σκέπτεσθαι, to look at carefully, to scrutinize]: Ger. *Skepticismus*; Fr. *scepticisme*; Ital. *scetticismo*. (1) The theory that positive and certain truth is not attainable by the human intellect; or (2) the theory that it is necessary to doubt before reaching truth.

As scepticism denotes a certain mental attitude or temper, or method of attacking philosophical problems, the purely formal definition is worth even less than are most terms which characterize philosophical systems. It varies from dogmatic assertion of unbelief, uncertainty, and the impossibility of attaining truth, to the most nicely balanced doubt which will not even assert that all is doubtful, into thoroughgoing subjection of all philosophical concepts to disbelief until rational grounds can be found for them. In this last sense it is opposed to dogmatism, rather than to theories of the impossibility of true knowledge. In this sense scepticism has been at least an implicit factor in all independent philosophy; it has been asserted by some (Descartes) to be the necessary preliminary to all philosophic belief, and by others (Hegel) to be a necessary moment in the complete self-evolution of every philosophic idea and system.

Very different motives have also contributed to the development of the sceptical attitude. There is (1) the strictly *philosophical*. This is generally evoked as reaction from highly dogmatic systems; and it endeavours, by criticizing their premises and methods, to show their entire untenability. This *motif* is reinforced, as a rule, by the fact that different dogmatic systems hold quite contrary views, and the arguments of one may be turned against those of another until they mutually demolish one another. Thus the opposition of the schools of Heraclitus and Parmenides was a great factor in calling out the scepticism of the SOPHISTS (q.v.). Moreover, the rapid appearance of diverse and incompatible systems produces a psychological condition of unrest and satiety of system which is highly favourable to scepticism.

(2) The *ethical*. A dogmatic system of thought tends to develop an over-positive and strenuous disposition in action, a temper which insists upon carrying its universals into all the details of conduct, and of imposing them upon others. It is the basis of political and theological exclusiveness and persecution. This is met by pointing out the fallibility and relativity of all such principles, leading to the consequent position that 'probability is the guide of life.' Hence the necessity of tempering even the most general principles in action by adaptation to circumstances, a moral opportunism; and as regards the conduct of others, of pursuing a policy of toleration. This motive, while not often explicitly stated, has perhaps been the animating spark of the most influential scepticism. It is certainly the chief motive of the scepticism of the middle Academy. It influenced also the school of sceptics headed by Pyrrho, but was overshadowed in him by another ethical motive — that imperturbability (complete balance, to give a somewhat too positive interpretation) is attainable only as the outcome of complete doubt, and this is the pre-condition of complete and undisturbed happiness. Cf. SCHOOLS OF GREECE, and PYRRHONISM.

(3) The *religious*. To do away with the capacity of reason for attaining substantial spiritual truth has been a favourite way of proving the necessity of a revelation of such truth, and establishing the incapacity of reason to impeach this truth when revealed. This motive influenced the Latin fathers of the Church, was active in mediaeval thought, the nominalistic theory of twofold truth (see SCHOLASTICISM) being only the explicit statement of what after all was a logical presupposition of the orthodox philosophy. Its most celebrated modern adherent is Pascal; but the point of view appears in another form in Mansel's *Limits of Religious Thought*, and, combined with other *motifs*, is contained in Balfour's *Foundations of Belief*.

(4) The *culture point of view*. This is generally united with the first and second tendencies, and arises from the feeling that dogmatism of thought is not compatible with wide learning and with the polite and urbane temper. It made itself felt in the Academics, particularly in Cicero. Montaigne is its consistent and delightful representative in modern thought; Hume is touched by it; while secondary philosophic writers, like Matthew Arnold, are quite sure to be permeated with it.

The arguments adduced in ancient thought for scepticism may be summed up as follows: (1) The relativity of the senses: in man and animals; in different men; in the same man in different conditions; among the different senses at the same time. (2) The relativity

of objects: dependent upon the medium; upon position and distance; and manifest in their constant change and dissolution. (3) The relativity of belief and opinion: customs, manners, fundamental moral and religious beliefs differ radically in different peoples. (4) The reasoning process itself is intrinsically inadequate, because all demonstration depends on prior assumptions or premises, and so on *ad infinitum*—the exact converse of the reasoning which made Aristotle assume ultimate unproved or self-evident premises—the axioms. The writings of Sextus Empiricus (about 200 A.D.) were a summary of all ancient arguments, and exercised great influence upon thought after the revival of learning.

Modern scepticism, as in Hume, draws freely upon the ancient arguments, and yet has a distinct colouring of its own. It consists largely in turning the senses and reason, as the two supposed sources of knowledge, against each other, as with Hume; and attempts by an analysis of the process and elements of (supposed) knowledge as such, rather than by accumulating particulars, to show its inherent incapacity to reach valid conclusions. It has thus been an indispensable factor in the evolution of the modern theory of knowledge. Indeed, the chief difference appears just here. Ancient scepticism acted simply as a check, or as resource to minds that could not accept the dogmatic systems. It reacted *from* them, but not *into* them; they continued practically unaffected, save in details. Modern scepticism has been an integral factor in constituting not merely the form, but the content of modern thought. In this general sense, at least, Kant's assertion that CRITICISM (q.v.) unites dogmatism and scepticism, and Hegel's contention that sceptical doubt is an immanent factor in all philosophizing, must be accepted.

Literature: SETH, art. Scepticism, Encyc. Brit. (9th ed.), xxi. 395–401; ZIMMERMANN, Darstellung d. Pyrrhonischen Philos.; SEPP, Pyrrhonische Studien; MACCOLL, Greek Sceptics from Pyrrho to Sextus; BROCHARD, Les Sceptiques grecs; TAFEL, Gesch. u. Krit. des Skepticismus u. Irrationalismus; SAISSET, Le Scepticisme; ZELLER, Stoics, Epicureans, and Sceptics; STÄUDLIN, Gesch. u. Geist des Skepticismus; OWEN, Evenings with the Sceptics. (J.D.)

Scheiner's Experiment: Ger. *Scheiner'scher Versuch*; Fr. *expérience de Scheiner*; Ital. *esperienza dello Scheiner*. An experiment in ocular accommodation, illustrating the formation of double images in the single eye. A needle is observed monocularly through two pinholes in a card, separated by a less distance than the diameter of the pupil. The arrangement has been employed in optometry (Helmholtz, *Physiol. Optik*, 2nd ed., 128), and, by Czermak, for colour mixture (ibid., 351).

Literature: SCHEINER, Oculus, 1619; SANFORD, Course in Exper. Psychol., expt. 106; WALLER, Human Physiol. (1891), 420. (E.B.T.)

Schelling, Friedrich Wilhelm Joseph von. (1775–1854.) Educated at Tübingen in theology, philosophy, and philology. Went to Leipzig (1796) and studied mathematics, natural science, and medicine for two years. Began lecturing in Jena as a colleague of Fichte. Became editor of the *Zeitschrift für speculative Physik*, 1800; professor in Würzburg, 1804; secretary of the Academy of Arts and Design in Munich, 1808; lecturer in Erlangen, 1820–6; professor of philosophy in the University of Landshut, 1826; called to Berlin, 1841. See IDEALISM.

Schema [Gr. σχῆμα, a diagram]: Ger. *Schema*; Fr. *schème*; Ital. *schema*. (1) The product, in the Kantian philosophy, of the exercise of the transcendental imagination in giving generality to sense and particularity to thought. See SCHEMATISM.

(2) A mode of construction; a formula for synthesis which as formula or method is general, but as embodied or acted upon is particular. Thus the triangle, or circle, to the geometer, is schematic. An image which illustrates a method of space construction (Kant, *Krit. d. reinen Vernunft*, 126–30 of Müller's translation).

The schema of quantity is number; of a reality is the continuous and uniform production of degrees of sensation; of substance is permanence in time; of causality, succession of manifold in time so far as subject to rule; of reciprocity, coexistence of the manifold in time so far as subject to rule. Democritus used the term schemata, σχήματα, to denote the characteristic forms of his atoms. It was also employed to designate the figures of the Aristotelian syllogism. (J.D.)

Schematism: Ger. *Schematismus*; Fr. *schématisme*; Ital. *schematismo*. The theory, in the Kantian analysis of knowledge, of the use of the transcendental imagination as mediating between sense and understanding.

Kant pushed his dualism between sense and understanding, or more strictly between the matter of intuition and the concepts or

functions of discursive thought, to such an extreme as to require a connecting bit. The former is immediately given, or received, in sensibility; it constitutes the material of knowledge, is manifold, and in itself is blind and unordered. The latter has only mediate reference, is an active and unifying process, and in itself is empty, i. e. is lacking in objective content and validity. Kant seems to have thought at first that the *a priori* forms of perception, space, and time would suffice to order the otherwise chaotic material of sense. At least, they are treated in the *aesthetic* as given and complete in themselves. But in the *analytic* it became apparent that space and time forms themselves had to be construed by means of the synthetic functions of thought. It also became obvious that the concepts needed to be imaged in order to exist even as definite subjective thoughts, to say nothing of acquiring valid objective reference. Hence the need of a go-between to overcome the heterogeneity of the two factors in all knowledge, a go-between, moreover, which is necessary even for the formally distinct existence of each factor. This was found in the pure or transcendental imagination which constructs the pure logical concepts in relation to the function which they perform in ordering time elements (the moment, duration, and succession). Time is like thought, as *a priori*; like sensibility as a manifold; and thus it possesses characteristics which render it homogeneous with both, and which fit it for occupying an intermediate position. Thus the schematism of the pure understanding 'treats of the sensuous conditions under which alone pure concepts of the understanding can be used' (Kant, *Critic of Pure Reason*, Pt. II. Bk. II. chap. i; see 119–24 of Müller's translation). (J.D.)

Schiller, Johann Christoph Friedrich von. (1759–1805.) German poet and critic. Educated in law and medicine in the new Carlsschule at Stuttgart. Appointed military surgeon to a regiment in that city, he ran away when ordered to desist from writing poetry, concealing himself for a year near Meiningen. He became dramatic poet for the Mannheim theatre; went to Leipzig and Dresden with Körner, 1785; visited Weimar and met Goethe, 1787; professor of history at Jena, 1789; formed Goethe's friendship about 1794; moved to Weimar, 1800; was ennobled, 1802, by Emperor Francis II.

Schilling, Gustav. (1815–72.) Born and educated in part at Köthen, he began the study of medicine in the Nikolaischule at Leipzig, but was won over to the study of Herbartian philosophy by Drobisch and Hartenstein. In 1840 he became Privatdocent at Giessen; professor extraordinary in 1846; and professor ordinary in 1851. He died at Giessen.

Schism [Gr. *σχίσμα*, a cleft]: Ger. *Schisma*; Fr. *schisme*; Ital. *scisma*. A breach within an ecclesiastical organization, caused by differences regarding doctrine or discipline, which leads to the formation of the dissenting party into a separate body.

The term schism, which etymologically signifies a split within a body, according to current usage is applied only when the breach has resulted in secession and separate organization. A schismatic is any one who promotes divisions which threaten secessions. (A.T.O.)

Schlegel, Friedrich. (1772–1829.) Educated at Göttingen and Leipzig; lectured (1801) in Jena, and (1802) in Paris; studied oriental languages in Paris; joined the Roman Catholic Church, 1808; settled in Vienna, where he lectured and wrote until his death. A native of Hanover, he was a historian of art, aesthetics, and philology.

Schleiermacher, Friedrich Ernst Daniel. (1768–1834.) Born at Breslau, he attended the Pedagogium of Niesky and the Barby seminary of the United Brethren; studied theology at Halle; private tutor and assistant preacher before 1796; after 1796 preacher for the *Charité* in Berlin; court chaplain at Stolpe, 1802; assistant professor of theology in Halle, 1804; preacher in the church of the Trinity, Berlin, 1809; professor at Berlin, 1810; secretary of the Academy, 1814. Cf. RELIGION (philosophy of, and psychology of).

Schmid, Leopold. (1808–69.) Born at Zürich; studied at Tübingen and Munich; professor of theology in the seminary at Limburg, 1831; at Giessen, 1839; elected bishop of Mainz, but Pope Pius IX refused to confirm him on account of his liberal views; left the theological, and entered the philosophical faculty at Giessen, 1867.

Scholastic: see LATIN AND SCHOLASTIC TERMINOLOGY, SCHOLASTICISM, and PATRISTIC PHILOSOPHY, and cf. VERBAL.

Scholasticism (the Schoolmen) [Lat. *scholasticus*, trans. of Gr. *σχολαστικός*, from *σχολάζειν*, to lecture, to be master of a school]: Ger. *Scholastik, scholastische Philosophie*; Fr. *philosophie scolastique*, or simply *scolastique*; Ital. (*la*) *scolastica*. (1) The

name of the period of mediaeval thought in which philosophy was pursued under the domination of theology, having for its aim the exposition of Christian dogma in its relations to reason. See HISTORY OF PHILOSOPHY, and LATIN AND SCHOLASTIC TERMINOLOGY.

(2) Any mode of thought characterized by excessive refinement and subtlety; the making of formal distinctions without end and without special point.

Scholasticism is distinguished, on one hand, from Arabian philosophy (see, however, lower down) carried on outside the pale of the Church; and from MYSTICISM (q.v.), which is found within the Church paralleling Scholasticism. The latter emphasizes logical and formal processes; as the former, feeling and inner experience. Charlemagne founded schools of learning all over France, which was, thereafter, the special home of learning and of science. The teachers were termed *doctores scholastici* (Ueberweg, *Hist. of Philos.*, i, according to whom the use of the term may be traced back to Theophrastus), while the wandering scholar-teachers from the mission schools of the Church were termed *scholastici* (Erdmann, *Hist. of Philos.*, i. 288). They were ecclesiastics, so it is not a matter of surprise that they philosophize wholly in the interests of the Church. The language is Latin. The method is comment upon and exposition of selected passages of Scripture and the early logicians, and finally of the Church fathers and Aristotle. They combined with their strictly philosophic pursuits all the science and culture of their age (in the *Trivium* and *Quadrivium*). Cf. PATRISTIC PHILOSOPHY.

The schools were founded in the 8th century, but it is not till the 9th that specifically philosophic thought appears. While in one sense scholasticism still continues as the official teaching of the Roman Catholic Church, its dominance and its independent career ceased with the Renaissance and the 15th century. The intervening five centuries are conveniently divided into three sub-periods: (1) the formation of scholasticism, formulation of its problems; (2) its systematization; (3) its decline. The three periods may also be characterized by their reference to antiquity. The first was based upon fragments of Aristotle's logical writings and Neo-Platonic commentaries; the second is due to systematic acquaintance with Aristotle; the third to the humanistic revival of all ancient learning, which, even when honouring Aristotle, gave him a freer interpretation.

I. In the first period, Scotus Erigena is in many respects nearer to the mystics than to the scholastics proper, and is pantheistic in his theology. He is influenced chiefly by the Neo-Platonists rather than by Aristotle. But in two respects he is extremely important for scholasticism in the narrower sense. (*a*) He asserts the essential identity of the content of faith and reason, and in the most immediate way. Any dictum of authority is reasonable, and every rational principle may be considered as dogma; true religion *is* true philosophy, and vice versa. The problem thus raised of the relation between the two is of determining importance for the entire period. (*b*) He assumes a complete parallelism of the hierarchy of being on one side, and thought on the other, proceeding from the most universal to the most particular; the former comprehends and produces the latter. Creation is equivalent to the logical unfolding or making explicit of the supreme universal, from God down, in a graded scale of beings, to the individual things of sense—the lowest form of reality. This might be termed the deductive process. On the other hand is the eternal return to God—i.e. the logical inclusion of the particulars again in the universal, the inductive movement. This involves, as applied to man, the theory of redemption, immortality, &c. Now the significance of this is not only in its frankly stated REALISM (q.v., 1), but in the use of this realism to state and explain the fundamental doctrines of the Church—those of creation, the Trinity, sin, and redemption.

In this connection the discussion becomes one of tremendous import—of the relation of God as the universal to the individual, to man. When separated from this relationship, the whole realistic-nominalistic discussion degenerates into formal subtleties and refinements. It is Anselm who carries out in a systematic and reflective way the philosophical statement of all the dogmas of the Church, and who sees in realism the only justification of the supreme authority of God, of the doctrine of the Trinity, and asserts that nominalism is only the deification of sensible things. It also leads him to the ONTOLOGICAL ARGUMENT (q.v.). Roscelin, as a nominalist, had shown that its effect on theology is to substitute a doctrine of tritheism for the Trinity, while Berengar

had used it to attack the doctrine of transubstantiation. Thus the doctrine was brought under the ban of the Church. But the statement of realism as a theory of the divine nature and of creation revealed the essential difficulties in it. Admitting that the universals are the real in the mind of God, and the archetypes of all created things, the problem arises as to just how these are related to the things of the sensible world. The doctrine easily lent itself to a pantheistic interpretation or absorption of individuals in God. This tendency was evident in William of Champeaux and also in Bernard of Chartres. It also led to the conclusion that since the class as substance is in all the individuals it includes (these being indeed only its accidents), one and the same substance must have mutually contradictory attributes. Hence Abélard attempts a mediation of these extreme views in a realistically tempered conceptualism. This theory was long completely victorious, and put to rest this strife, appearing satisfactory both theologically and logically.

But as to the other problem raised by Erigena, Abélard leaned decidedly to the side of reason; he attributes to it a decisive, not merely a formalizing power, and criticizes the fathers freely, bringing out their contradictions not to show how they may be nullified, but in order that reason may get at the truth of the matter—the *real* content of faith. So far as the logical movement is concerned, we find it after this time carried on in a highly rationalistic theology, as in Gilbert of Poitiers, and in the development of that system of argumentative distinctions which is still to some minds the chief characteristic of scholasticism. This brought out a reaction—a condemnation of all dialectic; and the assertion of the content of faith as supreme above all reason, as in Hugo, and still more the VICTORINES (q. v.)—following a more or less mystic path and occupied mainly with the anthropology of the inner religious life. John of Salisbury reacts in another direction, and occupies himself with a psychological examination of the questions which, on their logical side, had gone to seed in empty formalism—questions of the relation of sensation, perception, and understanding in arriving at concepts, and the psychical relations of faith, opinion, and knowledge; and also with scholarly synopses of previous thought.

II. The second period is not only richer in content, but much clearer in its main features. The struggle with oriental Mohammedanism and the outcome of the crusades resulted in opening Europe not only to Arabian philosophy with its interpretation of Aristotle, but also to Arabian and Jewish science, much wider and more exact than was occidental, and systematized, after the Aristotelian fashion, by relation to metaphysical principles. The period commences accordingly in the 13th century; and while in the early part of this century the writings of Aristotle are condemned by the Church, in the next century Aristotle stands on practically the same level with Augustine, the greatest of the fathers, and is officially declared to be the forerunner of Christ in natural matters, as John the Baptist was in matters of grace, and is known, briefly, as *The* philosopher. The writings of Aristotle were made known in their completeness; not simply the logical treatises—in fragmentary form at best. The scholastic method gets shape, consisting first in the breaking up of the text discussed into a number of propositions; secondly, questions are raised, and the variety of possible answers set forth; thirdly, arguments, *pro* and *con.*, are adduced in a syllogistic chain, leading to a conclusion. The logical distinguishing or dialectic, so developed in the previous period, and yet having little or no aim outside itself, now becomes a useful instrument, and is handled with great power, being reinforced by the more substantial parts of the Aristotelian logic. When we apply this apparatus, both of the substance—metaphysics, physics, psychology, and ethics—and form—the modified logic, or dialectic of thought—to the service of the doctrines of the Church (themselves the richest summary in existence of spiritual and ethical experience), we have the scholastic philosophy of this period, of which Windelband (*Hist. of Philos.*, 311) says it was 'an adjustment and arrangement of world-moving thoughts upon the largest and most imposing scale history has known.'

Alexander of Hales, Albertus Magnus, and St. Thomas Aquinas are the greatest of many names here. The first develops the method in a practical way, as a help to the orderly exposition and demonstration of dogma; the second develops it in a theoretical way, and as applied to the entire philosophy of Aristotle as well as to the dogma of the Church; while the third makes an organic fusion of the two factors, and thus brings the movement to its culmination. As to the content of their philosophy, it must be borne

in mind that Arabian Aristotelianism was conceived in a Neo-Platonic sense. It was pantheistic in tendency, denying the transcendence of the absolute reason or God; holding to the eternity of matter, 'creation' being the realization of potentiality, not a distinct act of effecting the world out of nothing; and denying the individual immortality of the soul. Hence Albertus and St. Thomas must, while adhering to Aristotle, justify the doctrines of the transcendent and creating God, and the immortal individuality of the soul, as distinct from its realistic absorption in deity. Cf. St. Thomas (philosophy of).

The Aristotelianism of these men produced a reaction, of which Duns Scotus is the leader: Bonaventura and Eckhart are classed among the mystics. Their controversy concerned three points in particular: (1) the relation of faith to reason; (2) the relation of intellect and will; (3) the nature of individuality.

(1) In spite of (or, better, because of) the conviction of Albertus and St. Thomas as to the relation of Aristotle to Church dogma, they are compelled to set aside certain doctrines as simply the products of revelation, utterly inaccessible to the natural mind—it being clear that Aristotle had not taught the doctrine of the Trinity or the Incarnation, &c. (In this period, as in the earlier one, it was the mystics who, drawing on Neo-Platonism, attempted a speculative construction of these doctrines.) They are above reason, but not contrary to it. The natural light can lead to certain truths, the content of natural religion and morality; but above this is supernatural religious and ethical truth, which is 'of grace,' not of nature, and is revealed, not discovered. This, the so-called doctrine of the *twofold truth*, is the basis of the teachings of Albert and St. Thomas. But having gone so far, it is difficult not to go further; and here is the rift in the lute which finally destroys the unity of scholasticism. Duns Scotus (generally regarded as the most acute philosophical mind of the period) held that theology was only a practical matter, aiming at salvation from sin, having to do with the will, not the intellect, while philosophy is pure theory. Each is right in its own sphere. The doctrine was conceived in good faith in order to give to dogma a claim untouched by reason; for Scotus was acute enough to see that if reason can assist or confirm theology, it can also attack or criticize it. But its actual effect was in the other direction. Reason was given greater scope and stringency; all sorts of propositions, theologically heretical, were proved, with the pious clause (sometimes in good faith, sometimes not) that though this was so according to reason, the opposite was true according to faith.

(2) The same insistence upon the practical side is found in the psychology and ethics of Scotus. While St. Thomas followed the Greek position which uniformly made knowledge, contemplation, identity of subject and object in rational intuition, higher than the will, Scotus followed Latin thought, which had found its religious expression in St. Augustine. The will, according to the Thomists, is determined by the good, which is discerned, both in general and in particular cases, by the reason (see Perseity); moreover, reason has an objective metaphysical significance, an intrinsic relation to truth. But Scotus gives a psychological, or historical, account of knowledge; it is a natural process, and hence, if the will is dependent upon it, it in turn is really determined by nature with its necessity. Hence the will, as self-included power of choice, is really fundamental. God is free, because of the radical primacy of the will. He created the world out of his sheer will, not in conformity to prescriptions of reason—a position which, of course, dovetailed excellently into the separation of theology from philosophy. Moreover, salvation is not the eternal vision or contemplation of God, but a state of will—love—superior to contemplation.

(3) The emphasis upon reason tends to leave the individual in a precarious condition, for it is connected with the Greek realism, the assertion of the higher reality of universals. While Aristotle had held to God as a transcendent individual, as pure form, Averroës had insisted that there is no form without matter, and thus developed a pantheistic theory. St. Thomas here, as in his theory of the sphere of grace and of nature, attempted to establish an equilibrium. In the immaterial world, pure and *subsistent* forms are real and active without any attachment to matter; while in the material, forms are realized only in matter (are *inherent*). Now man belongs to both worlds: as rational soul, he is the lowest of pure immaterial forms; as animal soul (having body), he is the highest of the other type. And in man both of these are bound together into a single unity—the only form which is both subsistent and inherent. But St. Thomas had also to deal with differences of personality—the so-called *principium*

individuationis. God is absolute genus and individual at the same time, and uniquely so. Each angel is relative genus and individual in one. But different human individualities have but one genus. Their differentiation is due to the determination of matter, to distinctions of time and place; hence they are substantialized only through their relations to definite bodies. Against this view, which seemed to them to deny spiritual and ethical individuality, the Scotists protested. According to them, the individual soul, *qua* individual or differentiated, is a self-subsistent reality, and is not a mere determination of a genus (see REALISM, 1).

III. There are both intrinsic and, relatively speaking, extrinsic reasons for the break-up of scholasticism. Intrinsically, in Thomism it reached its culmination. After reason and faith had each received its exact position, and reason had been used wherever possible to demonstrate faith, and when this was not possible, to show that, at least, the dogma was not contrary to reason, the scheme was virtually complete. To develop it was to transform it. And the Scotist teachings threatened in a more active way the unity of the system. This happened not only by emphasizing the rights of reason within the theoretical world, but by its assertion of the reality of the individual soul, which easily developed — as in William of Occam — into extreme nominalism, the doctrine that only individuals are anywhere real. Moreover, this led to empiricism, for while the universal can be apprehended in thought, the individual (as even Scotus had taught) must be met with in experience to be known. Moreover, Scotism had everywhere a more psychological colouring than Thomism, and by furthering reflection in empirical psychology, went far to usher in a new way of thinking. The external causes (stimulated, however, by these intrinsic ones) were HUMANISM (q. v.), the revival of learning, and the newly awakened interest in nature, with its daughter, mathematical and physical science. The latter finds its forerunner in Roger Bacon and its expression in Copernicus and Galileo. With them, the natural world of the scholastics, so intimately bound up with their metaphysics and theology, is destroyed, and a new order of conception ushered in.

Literature: of the histories of philosophy, ERDMANN is unusually full in this period; and WINDELBAND (who has been largely followed) is noteworthy in his seizing upon main problems and streams amid all the diversity of writings — a thing more difficult in Scholasticism than elsewhere. PRANTL'S Gesch. d. Logik is the authority on the logical side. The art. 'Scholasticism' in the Encyc. Brit. is an excellent summary. As general histories, we have HAURÉAU, Hist. de la philos. scol.; KAULICH, Gesch. d. skol. Philos.; and STÖCKL, Gesch. d. Philos. d. Mittelalters. See also ST. THOMAS (philosophy of). (J.D.)

Schoolmen (theology of the): Ger. *Lehre der Scholastiker*; Fr. *théologie scolastique*; Ital. *teologia degli scolastici*. The religious system developed by the Schoolmen of the middle ages, having for its characteristic aim the translation of the dogmas of the Christian faith derived from Scripture and tradition into a body of organized scientific knowledge by means of the application to them of the concepts and processes of philosophical reflection. See PATRISTIC PHILOSOPHY, SCHOLASTICISM, and ST. THOMAS (philosophy of).

The scholastic movement begins properly with the 11th century and extends on to the Reformation. Its differentiating characteristics as a theological movement are (1) its assumption of the Church dogmas as absolute and indisputable truth; (2) its introduction of philosophy, principally the dialectical system of Aristotle as an instrument for the translation of the proposition of faith into one of rational knowledge. Beginning practically with Anselm, the great Schoolmen include the names of Roscellinus, William of Champeaux, Abélard, Bernard of Clairvaux, Peter Lombard, John of Salisbury, Alexander of Hales, Bonaventura, Albertus Magnus, Thomas Aquinas, Duns Scotus, Roger Bacon, William of Occam, Raymond of Sabunde, and Nicholas of Cusa. The scholastic movement is divisible into two great periods, separated by the Arabian revolution of the 12th century, which placed a fuller knowledge of Aristotle at the disposal of European scholars.

Literature: HAMPDEN, The Schol. Philos. considered in its Relation to Christ. Theol. (London, 1838); THOMASIUS, Dogmengeschichte des Mittelalters (Erlangen, 1870); TOWNSEND, The Great Schoolmen of the Middle Ages (London, 1882); histories of philosophy, UEBERWEG and ERDMANN. See also SCHOLASTICISM. (A.T.O.)

Schools of Greece: Ger. *Philosophenschulen der Griechen*; Fr. *écoles philosophiques de la Grèce*; Ital. *scuole filosofiche dei Greci*. (1) In a looser sense, the various groups of

Greek thinkers, allied by race, locality, or opinion, e. g. Ionics, Sceptics.

(2) In a stricter sense, the more or less definitely organized groups which had personal relationship as a more or less fundamental element, and carried on joint labours under a recognized head or 'scholarch.' The ideas of some founder, such as Plato or Epicurus, were thus defended and elaborated by successive generations of the school.

I. The more important schools in the narrower sense may be grouped under three periods, Pre-Socratic, Socratic, and Post-Socratic. To the first belong (1) the Milesians, located at Miletus, comprising Thales, Anaximander, and Anaximenes, of the 6th century B.C. Heraclitus of Ephesus (about 536–470 B.C.) is often grouped with them under the general term Ionic school. (2) The Pythagoreans, of Crotona in Italy, founded by Pythagoras of Samos (born about 580 B.C.), and having Philolaus of the next century as the most prominent philosopher. (3) The Eleatics, of Elea in Italy, together with Xenophanes (of Colophon, born about 570 B.C.; his connection with Elea is doubtful), Parmenides (who wrote about 470 B.C.), and Zeno (about 490–430 B.C.); Melissus of Samos shared Eleatic views. (4) The Atomists, of Abdera in Thrace, of which Leucippus and Democritus (about 460–360 B.C.) are the leading members, although Protagoras (about 460–410 B.C.) went out from this city also. All the above, as well as Anaxagoras of Clazomenae (about 500–430 B.C.), who founded a school at Lampsacus, were Ionians. For their theories see PRE-SOCRATIC PHILOSOPHY. In the second half of the 5th century B.C. the schools or philosophical societies, with the exception of the Pythagoreans and the school of Abdera, gave place to the freer and more public discussion which characterized the teaching of the SOPHISTS (q. v.) and of Socrates.

II. The second period is that of Socrates (469–399 B.C.) and the Socratic schools. Socrates himself conducted his discussions in so public a manner that he could hardly be said to have a school. But his disciples founded several, each claiming to represent the teaching of the master. For Plato and his school, the Academy, as well as Socrates, see SOCRATIC PHILOSOPHY, and below.

The other Socratic schools were: (1) the school of Megara (the Megarians or Eristics), founded by Euclid, which applied the Eleatic metaphysics to the Socratic principles, maintaining the good to be the only being, and asserting that the actual and the possible are one. Eubulides, Alexinus, Diodorus Cronus, and Stilpo were members of the school, which was famous for its skill in 'eristic' or polemic, with a use of catch-questions and logical subtleties. Little is known of (2) the Elean-Eretrian school founded by Phaedo of Elis, which lasted but a short time, and had Menedemus as another member. (3) The Cynic school (named from the gymnasium Cynosarges, in which it was conducted) was founded by Antisthenes. Starting from the principle that virtue is the only good, the school argued that virtue must therefore make man independent of fate and fortune. It must then consist in freedom from wants—in living in a 'state of nature.' Diogenes is the famous representative of this. (4) The Cyrenaic school, founded by Aristippus of Cyrene, maintained that the good is to be found in pleasure. The Socratic element manifests itself in the doctrine that the completest pleasure can be gained only by intelligent insight and appraisal. This led to a preference of mental over bodily pleasure by later members of the school (Anniceris). Hegesias drew a pessimistic conclusion. The Epicureans were the heirs of the Cyrenaic teaching. See HEDONISM.

III. In the third period are included the most celebrated schools: (1) The *Academy* (from a grove and gymnasium named from the hero Academos), at first, as (*a*) the 'Older Academy,' developed Plato's teaching, especially on the ethical side, and combined with it the Pythagorean number theory; then, as (*b*) the Middle Academy, under Arcesilaus (about 315–241 B.C.) and Carneades (214–129 B.C.), was an exponent of SCEPTICISM (q. v.); and finally, in (*c*) the New Academy, under Philo of Larissa (about 100 B.C.) and Antiochus, turned to dogmatism and eclecticism. Plato's doctrines were later studied and developed in the form known as NEO-PLATONISM (q. v.) at Alexandria by Ammonius (175–250 A.D.) and Plotinus (204–69 A.D.), and also in a Syrian school founded by Iamblicus (died about 330 A.D.). Neo-Platonism at Athens was represented by Plutarch (died about 120 A.D.) and Proclus (411–85 A.D.). Damascius was head of the Academy when it was closed by the Emperor Justinian in 529 A.D.

(2) The *Peripatetic* school, founded by Aristotle (384–322 B.C.) was located in the Lyceum, a gymnasium sacred to Lycaean Apollo (Lycaeus, a mountain in Arcadia). The school was named from the shady walks

(περίπατοι) in which Aristotle talked with his disciples. Theophrastus (370–287 B.C.) and Strato, his successor, as head of the school, maintained and developed Aristotle's theories, but the school was especially active in literary, historical, and scientific studies. In ethics the school maintained a less extreme view than either Stoics or Epicureans, holding that external goods are necessary for the attainment of complete wellbeing, although, on the other hand, virtue is worthy to be sought for its own sake, and other goods without virtue are valueless.

(3) The *Stoic* school, founded at Athens by Zeno of Cyprus (about 340–265 B.C.), was so named from the porch (Στοὰ Ποικίλη) where Zeno taught. Of Zeno's successors, Cleanthes is known as the author of a hymn to Zeus, and Chrysippus (died 206 B.C.) for his extraordinary productiveness, and for the ability with which he systematized and defended the Stoic principles. The Stoic principles proved especially congenial to Roman thinkers, to whom they were presented especially by Panaetius (cir. 180–111 B.C.), with more or less of an eclectic adoption of ideas from other schools. Seneca (4–65 A.D.), Epictetus (cir. 100 A.D.), and Marcus Aurelius Antoninus (Emperor 161–180 A.D.) represent a Stoicism modified by religion. The doctrines of the school will be treated below in connection with those of the Epicureans.

(4) The *Epicurean* school was founded by Epicurus (341–270 B.C.) and conducted in the gardens of the master. Many works of Philodemus, a contemporary of Cicero, were found at Herculaneum, but the best known literary representative of the school is the Roman poet Lucretius (98–54 B.C.). The school was noted for the personal friendships which it fostered, and for the strictness with which it adhered to the founder's doctrines. It continued as late as the 4th century, and its principles were taken up and reproduced for the modern world by Gassendi (1592–1655).

The Socratic philosophy had (*a*) grown out of an attempt to interpret the life of Greek culture at its height. (*b*) It was given a dualistic development by Plato under the influence of the cult of Dionysus. It was partially restored to a philosophy of 'this world' by Aristotle, but the Platonic influence remained manifest in the very conceptions through which reality was conceived. (*c*) In this development the theoretical interest was always present, and in Aristotle assumed the commanding position. The Stoic and Epicurean schools represented a different attitude in each of these three respects. (i) Greek civic life had disintegrated. The rich artistic and political activity of the citizen had given place to the quest for a measure of happiness for the individual. (ii) The Stoic harked back to the more primitive animistic view of the world, especially in the form in which this was presented by Heraclitus (see Pre-Socratic Philosophy), and the Epicureans took up a negative attitude towards all religious conceptions. (iii) The dominant aim in both Stoic and Epicurean schools was practical. Theoretical interests were kept entirely subordinate.

(*a*) The common problem of both schools was—How can the individual lead a happy life? The Greek demand for intelligence, especially as formulated in the philosophy of Socrates, led both schools to give a common formal answer to their problem in their ideal of the sage—the wise man who knows the true good. Further, the political uncertainties, and the change from an attitude of boundless hope and thirst for achievement to an attitude of accepting certain limitations as inevitable, found expression in both systems in certain qualities of the ideal sage. He must above all be independent of the world's fortunes. This meant that he must be master of his own emotional life, for it is only through the feelings that we are at the mercy of events. Repose, imperturbability, apathy are the conditions most prized. But in defining how this shall be attained, the ways part. The Epicureans, following the Cyrenaics, seek this peace by a choice of the calmer pleasures, especially those of friendship and culture, by avoiding political or other responsibilities, and by freeing the mind from superstitious fears of the gods and the future. Far from teaching a coarse sensualism, Epicurus maintained that a wise man would not allow himself to become the slave of violent desires or passions; he will remain master of himself. The Stoics, on the other hand, maintained that the sage shows his wisdom, not in distinguishing *between* pleasures—as if feeling were after all the only good—but in maintaining the supremacy of reason as *against* feeling. The controlling or ruling faculty is the most important part of man. To obey reason is to 'follow nature'; to keep reason ever supreme is the chief excellence or virtue, and virtue is the only good; to overcome the world means to be completely free from passions or emotions. This is 'apathy.'

(*b*) The Stoic and Epicurean views of nature

stood in close connection with their ethical ideas. Epicurus found in the atomic theory of Democritus a view of the cosmos which offered a purely mechanical theory, and was hence adapted to banish superstitious dread of the unseen. The only important deviation from the earliest atomism was the assumption that to form the first complexes, the atoms deviated voluntarily from a straight line of fall. 'Voluntarily' here means 'without cause,' and the same conception of uncaused action was applied by Epicurus to the choice of the will (see FREEDOM). The Stoics, on the other hand, developed the primitive animistic theory of the cosmos in such a way as to make their conception capable of being characterized at once as pantheism and as materialism. This was effected through the conception of the PNEUMA (q. v., see also PSYCHE), which was on the one hand the all-pervading and animating spirit or life of the universe, and on the other was still a material substance, a finer air or fiery breath. In this pneuma each individual shares. Accordingly, to follow nature means not merely to follow human nature's highest principle of reason, but to conform to the all-pervading and controlling principle of the world, to the divine law or LOGOS (q. v.) which characterizes the pneuma in this its rational aspect.

Resignation to destiny, voluntary conformity to the on-going of the world, was thus given a rational motive, and with many took on the distinctly religious aspect of submission to the divine ordering of events. The early emphasis upon the control over the individual by some system or authority had retreated into the background in the presence of the search for a principle which should be first good and therefore binding. In the Stoic system this emphasis is restored in the conception of 'duty.' Further, this conception of participation in a common world-reason favoured the conception of man as a social being and a citizen of a world-state—a philosophic ideal which Cicero and later Roman thinkers applied to the Roman Empire. The law of this universal state is the 'law of nature,' i. e. of the universal reason. The Epicureans consistently held an individualistic view of the state, regarding it as formed by a 'compact' to supply human wants. Finally, in defending their view of the world as controlled by reason, the Stoics developed the leading arguments of TELEOLOGY (q. v.), while the Epicureans refused to admit their validity.

(*c*) As respects the problems of logic and epistemology, the Stoics and Epicureans were forced to assert some criterion as against the SCEPTICS (q. v.). Both schools assume that all knowledge comes from sense-perceptions. The Epicureans made the clearness or vividness of these the test. The Stoics found a further basis for the value of certain general conceptions in their metaphysical theory that the various human spirits or pneumata are emanations from the one world-pneuma. Ideas common to all men—*communes notiones*—may be presumed to be true. This theory as transformed into the doctrine of 'innate ideas' long remained influential. The Stoics also asserted the distinction between ideation and JUDGMENT (q. v.), and recognized in this latter a volitional element.

Literature: H. DIELS, Ueber die Philosophenschulen d. Griechen, in Zeller-Aufsätze (1887); USENER, Organisation d. wiss. Arbeit, Preuss. Jahrb., liii. 1 ff.; v. WILAMOWITZ-MÖLLENDORF, Antigonos von Karystos, Philol. Stud., iv. (1881) 269 ff.; E. HEITZ, Die Philosophenschulen Athens, Deutsche Rev., 1884, 326 ff. For the literature on the earlier schools see under PRE-SOCRATIC PHILOSOPHY; for the Socratic schools see ZELLER, Socrates and the Socratic Schools (trans. by Reichel, 1885), and the histories of philosophy by UEBERWEG and WINDELBAND; for the later period, in addition to the above, ZELLER, Plato and the Older Academy; Aristotle and the Earlier Peripatetics; and Stoics, Epicureans, and Sceptics; WEYGOLDT, Die Philos. d. Stoa (1883); OGEREAU, Essai sur le Syst. philos. des Stoïciens (1885); STEIN, Psychol. d. Stoa (1886–8); WALLACE, Epicureanism (1880); LUCRETIUS, De Rerum Natura (ed. and trans. by H. A. J. MUNRO, 1886); MASSON, Atomic Theory of Lucretius (1884); GUYAU, La Morale d'Épicure (1878); works of SENECA, EPICTETUS, and M. AURELIUS. See also under the titles HEDONISM, PYRRHONISM, NEO-PLATONISM, SOCRATIC PHILOSOPHY; and reports of recent literature on the earlier period by DIELS and WELLMANN, and on the later period by JOEL, in the Arch. f. Gesch. d. Philos. (J.H.T.)

Schopenhauer, Arthur. (1788–1860.) Born at Danzig, his father a banker, he studied at Göttingen, under the sceptic Schulze, being specially interested in Kant and Plato; heard Fichte in Berlin, 1811. Received the doctorate, 1813. Moved from Weimar to Dresden (1814–8), where he wrote his most important works. He made

two journeys into Italy, and two unsuccessful attempts (1820 and 1825) to lecture on philosophy at Berlin. After 1831 he lived in retirement at Frankfort-on-the-Main. See VOLUNTARISM, and OPTIMISM AND PESSIMISM.

Schopenhauerism (or **-eanism**): Ger. *die Schopenhauer'sche Philosophie*; Fr. *Schopenhauerisme*; Ital. *Schopenhauerismo*. (1) The philosophy of Schopenhauer. (2) VOLUNTARISM (q. v.). (J.D.)

Schubert, Gotthilf Heinrich. (1780–1860.) Naturalist and philosopher, educated at Jena and Leipzig. He became professor of natural science at Erlangen.

Schulze, Gottlob Ernst. (1761–1833.) An opponent of Kant. Born at Heldrungen in Thüringen. Professor at Göttingen after 1810.

Science [Lat. *scientia*, knowledge]: Ger. (1) *Wissenschaft*, (2) *Naturwissenschaft*, *exakte Wissenschaft*; Fr. *science*; Ital. *scienza*. (1) Knowledge; in particular, knowledge in the eminent sense as the outcome of the systematic and trustworthy functioning of the cognitive processes. Systematic co-ordination and certainty have, therefore, often been specified as the notes of science.

In this sense the term may be used of knowledge as a whole, or of any branch or department of knowledge which is so far ordered and reliable that it is entitled to the name. Distributively (or in contrast to philosophy, see below), the various subordinate branches of knowledge are known as the sciences, the particular sciences, the special sciences, &c.; and various distinctions are drawn in definition of the differences among them. The formal sciences are contrasted with the sciences of content, and pure science with applied science. The exact sciences are those which admit of precise quantitative treatment. Physical science or the physical sciences, material science or the material sciences, deal with the facts and laws of the physical world; the terms natural science and the natural sciences have an equivalent meaning, except when they are employed, as becomes increasingly the case, to cover the knowledge of the psychical as well as of physical nature (cf. NATURAL, and see NATURALISM, 3).

Mental science is generally used as a synonym for psychology, and, especially since the differentiation of psychology from philosophy, for empirical, in distinction from rational, psychology; it is also employed, but the practice is obsolescent and of doubtful propriety, in designation of philosophy. In a similar way, moral science may denote empirical and speculative ethics, sometimes practical science or practical philosophy in all their several divisions. Philological science, historical, political, or social science, metaphysical science, theological science, &c., are further illustrations of the comprehensive significance of the term according to its etymology and historical usage.

(2) In a more limited sense, empirical science or the empirical sciences, positive science or the positive sciences, or science without qualification, signify that form of investigation which confines itself to phenomena and the laws of phenomenal reality, together with the results of such investigation. This type of thought is also called inductive science, experimental science, &c.; while, in a looser way, physical science, natural science, &c., have been used to designate it in consequence of the prominence of the sciences of material fact in the historical development of empirical inquiry.

Various accounts have been given of the relation of philosophy to the particular sciences, and to science in the restricted sense. The distinction between them has been made to depend on the partial and more concrete character of the special sciences, in contrast to philosophy as general and universal science; on the functions of philosophy in determining the boundaries of the particular sciences, in discussing the logical and epistemological principles which they imply, and, especially, in framing a critical synthesis of their results; on the fact that science abstracts from the relation to the knowing subject as well as from the ideal aspects of thought and being; on the 'merely hypothetical validity' of science, whereas philosophy has to do with 'ultimate reality'; on the limitation of science to phenomena over against the relation of philosophy to ultimate and to transcendent problems, &c. But whatever view is adopted, there is now a much larger measure of agreement than in previous times in recognizing the intimate and vital connection of the two forms of knowledge. See PHILOSOPHY, CLASSIFICATION OF THE SCIENCES, BIOLOGICAL SCIENCES, MENTAL AND MORAL SCIENCES, PHYSICAL SCIENCE, MATHEMATICS, ETHICS, PSYCHOLOGY, and SOCIAL SCIENCE. (A.C.A.Jr.)

The characteristics of exact or experimental science—apart from its inductive procedure—are (1) the use of measurement, giving quantitative statements of results, and (2) the reduction of more complex to more simple

groups of phenomena, the latter being accomplished mainly by experimentation. These characteristics are realized in the physical sciences, where the conservation and transformation of energy permit the use of exact units of measurement. Here the mathematical principles of substitution, continuous change, and deduction apply. So soon, however, as we come to the natural or biological sciences, the use of measurement is subject to a remarkable limitation. Transformation of energy has not been made out and no exact units of quantity have been determined. The fact of growth presents difficulties to the theory of change, because organic groupings seem to have inherent principles of development. So far as natural science has gone in being quantitative, it is mainly for purposes of classification. The difficulty is in part surmounted by the resort to the theory of probability, vital phenomena in many cases being treated as variations, and their laws of distribution, relative frequency, &c., investigated by the theory of ERRORS (q. v.). Cf. VARIATION (statistical treatment of).

This difficulty goes deeper also; it affects the results of experimentation. The analysis which it is the main utility of experiment to afford cannot be adequate or really explanatory without units of exact statement; that is, the analysis of a more complex group into a more simple group of phenomena must show that all the elements of the former are statable in certain units of the latter. But without vital units of measurement this cannot be done. No stage of subsequent growth is adequately stated in terms of earlier growth. The best that can be done is to get a series of curves of variation for the different stages (say the height of children of 8, 9, &c., years) and investigate the relation of these curves to one another. When that is done, the results are, or may be, laws of growth, but they do not state the analysis of the higher stages in terms of the lower, nor of either in terms of elementary units.

In view of these limitations of quantitative measurement and of experimental analysis, the biological sciences may be described as evolutional or genetic. Genetic statements largely take the place of quantitative statements. The attempt to reduce vital changes to redistribution of matter in motion under mechanical principles has been made in a schematic but altogether hypothetical way. If it be ever done it will be an achievement of chemistry; but when we remember that not only the cycle of the individual life with its infinite chemical compositions and decompositions must be accounted for as occurring in a single system, but with it occur the combinations of systems in reproduction, and the projection of new vital systems in heredity—a sort of returning upon itself of life at birth-nodes—we find an undertaking before which even the investigation of the celestial system pales into insignificance. When we talk of a chemical or mechanical explanation of life, we forget that life is a system, and that to explain it we must have a principle by which we can not only account for all its minute phenomena, but predict them all as well. Cf. BIOLOGICAL SCIENCES.

In much the same sense PSYCHOLOGY (q. v.) and ETHICS (q. v.) are genetic; they present certain peculiar features which remove them even more widely from the quantitative sciences. Cf. MORAL SCIENCES. (J.M.B.)

Literature: J. T. MERZ, Hist. of European Thought in the Nineteenth Century, 1–301; A. COMTE, Cours de Philos. Positive, i. 1; H. SPENCER, First Princ., §§ 35–8; W. WUNDT, Syst. d. Philos., 10–37; F. PAULSEN, Einleitung in die Philos., Einl., § 2; G. T. LADD, Introd. to Philos., i, iii, iv; J. H. W. STUCKENBERG, Introd. to the Study of Philos., iii, iv. Also WHEWELL, Hist. of the Inductive Sci.; VENN, Princ. of Sci.; SIGWART, Logic; PEARSON, Grammar of Sci. (2nd ed., 1899); DU BOIS-REYMOND, Natur u. Grenzen d. Naturwiss.; STALLO, The Concepts of Mod. Physics. (A.C.A. JR.–J.M.B.)

Scientific Method: Ger. *wissenschaftliche Methode*; Fr. *méthode scientifique*; Ital. *metodo scientifico*. The general method of successful scientific research. The following are some of its characteristics. Cf. SCIENCE.

(1) The student's first step is to form a perfectly definite and consistent idea of what the problem really is; then he ought to develop the mathematics of the subject in hand as far as possible; and to establish a mathematical method appropriate to the particular problem, if it be one which allows exact treatment. As examples and models of what is meant, may be mentioned Maxwell's researches on colour sensation in the *Philos. Trans.* for 1860, Flinders Petrie's book *Inductive Metrology*, the last chapters of Pearson's *Grammar of Science*. Of course, as the student's understanding of the matter advances, he will return to this first task, and continually improve upon his first essays.

The second step will be to consider the logic and methodeutic of the research in hand, unless it is itself a question of pure mathematics, where the logic is inseparable from the mathematics. He will do well to study the manner in which questions somewhat analogous to his own have been successfully resolved in widely different fields; for the greatest advantage has accrued from the extension of methods from one subject to a widely different one, especially from simple to intricate matters.

The third step should be to reform his metaphysics, if the question is a broad one. Perhaps he thinks he has no metaphysics, and does not wish to have any. That will be a sure sign that he is badly handicapped with metaphysics of the crudest quality. The only way to disburden himself of it is to direct his attention to it. But he cannot reduce himself to anything like absolute scepticism in metaphysics without arresting his work. [This is especially true and important for psychologists.—J.M.B.]

The fourth step will be to study the laws of the phenomena dealt with, so far as they can be made out at this stage. The general order of discovery in the nomological sciences is first to pick up the phenomena by excursions in those fields in which they are to be found, with alertness of observation, with those clear ideas that makes the new fact instantly recognizable as new, and with the energy that seizes upon the faint trace and follows it up. Witness the manner in which all the new phenomena of radiation have been brought to light during the last generation: cathode rays, X rays, Becquerel rays, etc. After making some acquaintance with the phenomena, the next discovery is of their laws (nomological). In the light of one's metaphysics and general conception of the department of truth dealt with, one considers what different hypotheses have any claims to investigation. The leading considerations here will be those of the 'economics' of research. If, for example, a hypothesis would necessitate an experimental result that can be cheaply refuted if it is not true, or would be greatly at variance with preconceived ideas, that hypothesis has a strong claim to early examination. But one must not give up a hypothesis too readily. Many a discovery has been missed by that fault. Gravitation would have been known a decade earlier if Newton had not hastily thought it refuted, and so set back all the subsequent history of physics by something like that amount of time lost. It is likely that thousands of persons more will die of consumption—as remote as that may seem—than would have died if he had not made that error. The testing of the hypothesis proceeds by deducing from it experimental consequences almost incredible, and finding that they really happen, or that some modification of the theory is required, or else that it must be entirely abandoned. The law of the phenomena once made out, it only remains to measure with precision the values of the coefficients in the equation which expresses it.

The problem under investigation may not be of a nomological kind. Not that the phenomena are not conceivably subject to law, so that the subject may ultimately be received into the nomological sciences,—as chemistry, for example, promises some day to mature into a nomological science; but in the present state of knowledge the question, we will suppose, cannot be so studied. Still, a certain amount of nomological study is a necessary preliminary to engaging with the problem itself. Biology calls for aid from physiology. The student who is studying the growth of languages must avail himself of all the knowledge that there is about the physics of speech sounds. In case, then, the question has not yet reached the nomological stage, the sixth step in the work will be of a classificatory nature. Such order, of a more or less imperfect kind, as can be traced in the phenomena must be made out. Students of the classificatory sciences like to call such regularities laws. The tendency is a symptom of health; because it shows that law is their ideal, and that they are striving to bring their sciences to the nomological stage. But such orderlinesses as 'Grimm's Law' (see GENDER) and 'Mendeléef's Law' are not laws in the sense in which the association of ideas and the three laws of motion are laws. They are not satisfactory for a minute. They are nothing that can blend with our metaphysics; they are not of a universal kind; and they are not precise. You may imagine that there might be a chain of more and more universal, precise, and reasonable regularities leading from these to those. But there is, in fact, a great gap, which has to be acknowledged. A hypothesis may be made about the cause of the three laws of motion; but we can have no present hopes of satisfactorily proving the truth of such a thing; while we at once set to work with great hopes of making considerable steps towards explaining Mendeléef's Law and Grimm's Law. But the most important dis-

tinction between true laws and such regularities lies in the very different way in which we proceed to the discovery of the one and of the other. The whole attitude of mind is so different that it is difficult to believe that the same man would have great success in the two tasks. We have seen in our day the establishment of a grand example of each kind, the Law of the CONSERVATION OF ENERGY (q. v.) and the Periodic Law. The one dealt with a small number of observations. Exactitude was the main thing. The hypothesis itself sprang almost immediately from the natural light of reason. In the other case, it was necessary with a positive effort to put ideas of exactitude aside and to find order in a great tangle of facts.

Perhaps the problem in hand relates to one of those sciences basely called descriptive, that is, sciences which study, not classes of facts, but individual facts, such as history, descriptive astronomy, geography. No science is merely descriptive. These sciences are investigations of causes. The historian's facts of observation are not those contained in his text, but those mentioned in the foot-notes —the documents and monuments. It is the supposed causes of these which make the text. Nor is he contented with a mere chronicle of striking public events ; he endeavours to show what the hidden causes of them were. So the astronomer's real business is to prove the NEBULAR HYPOTHESIS (q. v.) or whatever ought to replace it. The geologist does not merely make a geological map, but shows how the existing state of things must have come to pass. To do this the historian has to be a profound psychologist, the geologist a master of physics and dynamics. Just as the classificatory sciences tend to become nomological, so the descriptive, or explanatory, sciences tend to become classificatory. The astronomer finds so many examples of systems in formation, that he can formulate the cycle of events through which they generally pass; as the historian formulates cycles through which communities usually pass, and the geologist formulates cycles through which continents commonly pass. These are analogous to the cyclical laws of the classificatory sciences.

But perhaps the problem before the student is not one of theoretical physics or of theoretical psychics, but a practical problem. He wishes to invent. In that case he ought to have a great knowledge both of facts about men's minds and of facts about matter; for he has to adapt the one to the other. He ought to know more than any pure scientist can be expected to know. Of course, as the world goes, he does not.

(2) The most vital factors in the method of modern science have not been the following of this or that logical prescription—although these have had their value too—but they have been the moral factors. First of these has been the genuine love of truth and conviction that nothing else could long endure. Given that men strive after the truth, and, in the nature of things, they will get it in a measure. The greatest difference between the scientific state of the modern scientific era from Copernicus and the middle ages, is that now the whole concern of students is to find out the truth; while then it was to put into a rational light the faith of which they were already possessed. The chief obstacle to the advance of science among students of science in the modern era has been that they were teachers, and feared the effect of this or that theory. But the salvation from this danger has been the fact that there was no vast institution which anybody for a moment hoped could withstand the mighty tide of fact. The next most vital factor of the method of modern science is that it has been made social. On the one hand, what a scientific man recognizes as a fact of science must be something open to anybody to observe, provided he fulfils the necessary conditions, external and internal. As long as only one man has been able to see a marking upon the planet Venus, it is not an established fact. Ghost stories and all that cannot become the subject of genuine science until they can in some way be welded to ordinary experience. On the other hand, the method of modern science is social in respect to the solidarity of its efforts. The scientific world is like a colony of insects, in that the individual strives to produce that which he himself cannot hope to enjoy. One generation collects premises in order that a distant generation may discover what they mean. When a problem comes before the scientific world, a hundred men immediately set all their energies to work upon it. One contributes this, another that. Another company, standing upon the shoulders of the first, strike a little higher, until at last the parapet is attained. Still another moral factor of the method of science, perhaps even more vital than the last, is the self-confidence of it. In order to appreciate this, it is to be remembered that the entire fabric of science has to

be built up out of surmises at truth. All that experiment can do is to tell us when we have surmised wrong. The right surmise is left for us to produce. The ancient world under these circumstances, with the exception of a few men born out of their time, looked upon physics as something about which only vague surmises could be made, and upon which close study would be thrown away. So, venturing nothing, they naturally could gain nothing. But modern science has never faltered in its confidence that it would ultimately find out the truth concerning any question in which it could apply the check of experiment.

These are some of the more vital factors of the method of modern science. For the purely logical elements the reader should consult special topics, e.g. REASONING, PROBABLE INFERENCE, PSYCHOPHYSICAL METHODS, ERRORS OF OBSERVATION, EMPIRICAL LOGIC, VARIATION, &c. (C.S.P., J.M.B.)

Sclerosis [Gr. *σκληρός*, hard]: Ger. *Sklerose*; Fr. *sclérose*; Ital. *sclerosi*. Induration of the substance of the central nervous tissue, usually by the increase of fibrillary connective tissue.

The medullary sheaths are destroyed, but the axis cylinder often persists for a long time thereafter. The blood-vessels show an increase in their nuclei and a thickening of the walls.

Multiple sclerosis: a diffuse sclerosis where foci of hardening are scattered throughout the central nervous system, especially in the white matter. The cause of the disease is obscure, and its symptoms vary by reason of the diverse sites of the lesions.

Amyotrophic (*myoatrophic*) *lateral sclerosis*: an affection of the cortico-muscular tract of the cord, appearing as a degenerative atrophy in the lumbar region. Atrophy of the muscles soon supervenes. The hardening of the interstitial tissue goes hand in hand with the swelling of the axis cylinders and atrophy of the motor neurones. The cause of the disease is unknown.

Primary lateral sclerosis (spastic spinal paralysis): this disease is characterized by exaggerated tendon reflexes and paralysis of the limbs.

Combined lateral and dorsal (posterior) sclerosis resembles TABES (q. v.). (H.H.)

Scope (in logic): Ger. *Umfang*; Fr. *étendue, portée*; Ital. *estensione*. The aggregate of subjects to which a term, proposition, reasoning, inquiry, treatise, &c., refers or is intended to refer; the logical *breadth*. Cf. EXTENSION (in logic).

Whether it embraces real individual things external to the mind, or individual percepts, or general terms, is a question upon which there is no agreement among logicians. We may accept the statement of B. Erdmann that the aggregate of species constitutes the scope (Umfang) in the proper sense of the term, while in a broader sense it comprises the collection of single objects. (C.S.P.)

Scotism: Ger. *Scotismus*; Fr. *Scotisme*; Ital. *Scotismo*. The philosophic system and tendencies of Joannes Duns Scotus; opposed to Thomism, the system of ST. THOMAS (q. v., philosophy of). It is characterized by its tendency to separate philosophy from theology (see TWOFOLD TRUTH); its indeterminism, and emphasis upon will (see VOLUNTARISM); and by a movement in the direction of nominalism, although Scotus himself remained a realist. See TERMINISM, OCCAMISM, and REALISM (1). (J.D.)

Scottish Philosophy: see NATURAL REALISM, and REALISM.

Scotus Erigena: see ERIGENA, SCOTUS, and SCHOLASTICISM, I.

Scotus, Joannes Duns: see DUNS SCOTUS, JOANNES, and SCHOLASTICISM, II.

Scriptures [Lat. *scripturae*, from *scribere*, to write]: Ger. *heilige Schrift*; Fr. *Écritures*; Ital. *Sacre Scritture*. The sacred writings or books of any religion containing inspired and authoritative enunciations regarding doctrine, worship, or the conduct of life. In particular, the sacred writings of Judaism and Christianity as contained in the BIBLE (q. v.).

Literature: see BIBLE, and KORAN. (A.T.O.)

Scruple [Lat. *scrupulus*, a small sharp stone]: Ger. *Skrupel*; Fr. *scrupule*; Ital. *scrupolo*. Less important ground of moral hesitation; applied also to moral hesitation without ground. (J.M.B.)

Secondary (or **-darily**) **Automatic**: see AUTOMATIC ACTION.

Secondary Quality: see QUALITY AND QUALE.

Secrétan, Charles. (1818–95.) Educated at Lausanne, and studied at Munich under Schelling. After some years as lawyer and editor of the *Revue Suisse*, he became professor of philosophy at Lausanne (1841), Neuchâtel (1850), and Lausanne again (1866). Besides his work in general philosophy, he was a strong factor in French Protestant theology, and took a prominent part in the social movements of Latin Switzerland.

Secretion [Lat. *secretio*, a dividing]: Ger.

Absonderung; Fr. *sécrétion*; Ital. *secrezione*. (1) The elaboration and separation of substances by glandular cells. See GLAND.

(2) Substance thus elaborated or separated.

The term was early applied to the original conception, viz. that a gland simply separated out different constituents already existing in the blood and lymph. More careful analysis soon demonstrated that the characteristic substances of many secretions were not present in the blood, hence more and more importance has come to attach to the work of secreting cells in transforming and elaborating their special products. The secreting cells must be supposed to have the power of causing their secretions to flow in a definite direction, generally towards the duct of the gland or towards a free surface, while other products of their activity are turned back towards the basement membrane and enter the lymph and blood stream. The entire secretion of certain ductless glands, such as the glandular portion of the pituitary body, thymus, and advenal body, as well as an important part of the secretions of other glands, come into this relation with the blood. These are called internal secretions. Substances secreted that are of use to the body are sometimes designated as true secretions; while those that are injurious and must be removed from the body are termed excretions. (C.F.H.)

The importance of certain of the internal secretions has recently been shown both in the economy of organic life and growth and as of developmental significance; especially in two ways: (1) as being necessary to the health and normal function of organs seemingly very remote, and (2) as showing utility in organs having apparent function. (J.M.B.)

Sect [Lat. *secta*, from *secare*, to cut]: Ger. *Religionspartei, Sekte*; Fr. *secte*; Ital. *setta*. A body within a larger organization, whose members are bound together, and to a greater or less degree differentiated from the remaining members, by certain distinctive doctrines or practices.

A sect may exist without organization or it may organize and reach the stage of a schism. The Reformation created a schism in the Romish Church, and many of the sects of Protestantism have led to schisms.

The topic and the term have become important in recent sociological discussion (cf. Simmel, 'The Persistence of Social Groups,' *Année Sociol.*, i); see (for literature) SOCIOLOGY, and SOCIAL PSYCHOLOGY, and cf. GROUP (social). (A.T.O.)

Secundum quid [Lat.]: relatively; under limitations in certain respects. See PERSEITY, passim. (C.S.P.)

Segmentation [Lat. *segmentum*, a segment]: Ger. *Segmentation* (cf. CLEAVAGE); Fr. *segmentation*; Ital. *segmentazione*. (1) The division of the developing ovum into several cells. See CLEAVAGE.

(2) The division of the body of an animal into a series of segments, or metameres, of more or less similar structure.

Amongst animals, especially those of elongated shape, there is almost always a tendency, so to speak, towards a reduplication of parts, which may lead to the formation of a series of very similar segments, as in worms and arthropods. Segmentation usually takes its origin in the mid-layer, mesoderm, the coelom being formed as a series of cavities in the embryo. In higher forms this metameric segmentation may again become obscured by the fusion and modification of a number of segments, as for instance in the formation of the vertebrate head. See EMBRYOLOGY, and COELOM. (C.LL.M.–E.S.G.)

Segregation: see ISOLATION.

Selection (in biology) [Lat. *selectus*, chosen]: Ger. (1) *Auswahl*, (2) *Auslese, Selektion*; Fr. *sélection*; Ital. *selezione, scelta*. The process by which preferential survival is effected in the struggle for EXISTENCE (q. v.).

Selection in this sense may be (*a*) conscious and purposive, i. e. with the improvement of the race as a definite end in view, e. g. man's selection in many of its phases; (*b*) conscious but not purposive, e. g. sexual selection (selective mating) among animals; or (*c*) unconscious, as in natural selection, when, for example, hardy birds survive through a severe winter.

Thus (cf. SELECTION, in psychology):

(1) Conscious selection—
  (*a*) Purposive (artificial, social).
  (*b*) Non-purposive, e. g. sexual.
(2) Unconscious selection (natural selection).

Under conscious selection we have:

(*a*) *Purposive selection.* Darwin used the phrase ARTIFICIAL SELECTION (q. v.) for the purposive improvement by man of animals or plants by breeding. One of two broadly contrasted methods may be employed in accordance with circumstances: (1) the best animals or plants may be chosen out for the propagation of the race; (2) the weakly, or those which depart in some way from the desired type, may be eliminated or excluded from such propagation. The net result, so

far as the continuance of the race is concerned, is much the same in either case; but the method by which it is reached differs according as we begin with the best (chosen for propagation) and work downwards, or begin with the worst (chosen for destruction) and work upwards.

We may use the phrase SOCIAL SELECTION (q. v., Baldwin) for purposive selection in and by mankind under social conditions. Here the reference to the improvement of the race and the propagation of the best is largely indirect; but the selection is in conformity with some ideal. And by choosing out the best, morally and intellectually, for positions of trust and emolument, and by hanging or imprisoning the worst—'social suppression'—an influence on the race of the future is produced.

(*b*) *Non-purposive selection.* This closely corresponds with James Ward's SUBJECTIVE SELECTION (see *Encyc. Brit.*, 9th ed., art. Psychology). Here the effects are wrought through an appeal to the consciousness of the organism—though there is no purposive end in view beyond, at most, immediate gratification. Darwin used the phrase SEXUAL SELECTION (q.v.) to include (1) selective mating, (2) elimination through combat at the sexual period. The two are no doubt closely connected; but the appeal to consciousness is more direct in the former. In selective mating, that individual is chosen as mate which most strongly stirs the sexual impulse. Selection is from above downwards. In the contests of males the weakest are killed or maimed. Elimination is from below upwards. Apart from sexual selection, consciousness plays its part in the struggle for existence among all the higher animals, though its effects are difficult to disentangle from those of unconscious selection. Where animals, for example, prey upon each other, consciousness as a factor cannot be excluded.

(*c*) *Unconscious selection.* In very much of what Darwin termed NATURAL SELECTION (q. v.), consciousness plays no part throughout the vegetable kingdom, for example. Here the method is entirely that of elimination from below upwards. The weakest go first; only the ultimate survivors reach maturity and mate. In what Weismann has termed personelle Selektion (in English individual selection), individuals survive in virtue of the possession of adaptations sufficiently marked to enable them to escape elimination. In GROUP SELECTION (q. v.) survival is largely determined not by individual adaptation *per se*, but by the co-ordinated relationships within the group. The survival of certain groups of insects, for example, may have been determined by the production of imperfect females or neuters, and by the division of labour thus rendered possible. In what Karl Pearson has termed REPRODUCTIVE OR GENETIC SELECTION (q.v.), when the variation of an organ or character is correlated with greater fertility, there is under heredity a *vera causa* of progressive evolution of this organ or character; since an increasing number of individuals will be born with the organ in excess (or defect), and consequently the mean of the general population will be progressively modified. The term INTRASELECTION (q. v., Roux) has been applied to the results of a competition between the cells, tissues, or organs for the necessary nutriment in the 'struggle of parts.' It would seem to be a factor in the modifications of individual life rather than in the genesis of hereditary variations. Weismann has suggested that there is a similar process in the germinal substance (GERMINAL SELECTION, q. v.) whereby the 'determinants' of certain characters absorb nutriment more rapidly or effectually than those of other characters, and thus produce stronger descendants. Mark Baldwin has suggested that the phrase ORGANIC SELECTION (q. v.), or indirect selection, be applied to the process by which COINCIDENT VARIATIONS (q. v., Ll. Morgan) are favoured and nursed in individuals which survive through accommodation to the environment, reached by tissue modifications. Romanes applied the phrase PHYSIOLOGICAL SELECTION (q. v.) to the race survival of those organisms which are sexually compatible, or of those intergenerants whose sexual products ripen at the same period, the sexually incompatible and those intergenerants whose sexual products ripen at different times being eliminated from race-propagation.

Mark Baldwin employs the term FUNCTIONAL SELECTION (q. v.) to the conscious selection by the individual through a process of trial and error of those movements by which satisfactory results are attained (cf. EXPERIMENTATION, as a mental process). This, like intraselection, is a factor in the modification of individual life, but through 'organic selection' may take effect in the race.

The phrase 'selective agents' is applied to those environmental forces or groups of forces through which selection in any of its

phases is effected. Romanes suggested that the term 'selection value' be applied to that amount of utility which suffices to determine survival. It is beginning to be recognized that the statistical method must be rigorously applied so as to enable biologists to formulate in definite numerical terms the results of selective processes. (C.Ll.M.)

The following table, first printed by the writer in *Science* (Nov. 19, 1897), and revised to include suggestions made by Osborn, Poulton, and Ll. Morgan, classifies the different sorts of selection in a way to distinguish the means in each case from the result. The phrase 'utility selection' is current for biological selection, since the reason of survival is some degree of utility. (J.M.B.)

Sort.	Means.	Result.
1, 2. Natural Selection.	1. Struggle for Existence. 2. Inherent Weakness; without Struggle.	1. 'Survival of the Fittest' Individuals. 2. Destruction of Unfit Individuals.
3. Germinal Selection.	3. Struggle of Germinal Elements.	3. Survival of Fittest Germinal Elements.
4. Intraselection.	4. Struggle of Parts.	4. Survival of Fittest Organs.
5. Functional Selection.	5. Overproduction of Movements.	5. Survival of Fittest Functions.
6. Organic Selection.	6. Accommodation, Individual Adaptation, Modification.	6. Survival of Accommodating Individuals.
7. Artificial Selection.	7. Choice for Planting and for Mating together.	7. Reproduction of Desirable Individuals.
8. Personal Selection.	8. Choice.	8. Employment and Survival of Socially Available Individuals.
9. Sexual Selection.	9. Conscious Selection by Courting, &c.	9. Reproduction of Attractive Individuals.
10. Social Selection.	10. Social Competition of Individuals and Groups with Natural Selection.	10. Survival of Socially Fittest Individuals and Groups.
11. Social Suppression.	11. Suppression of Socially Unfittest (by Law, Custom, &c.).	11. Survival of the Socially Fit.
12. Imitative Selection, Social Generalization.	12. Imitative Propagation from Mind to Mind with Social Heredity.	12. Survival of Ideas, Customs, &c.
13. Physiological Selection.	13. Infertility.	13. Survival of the Divergent.
14. Reproductive or Genetic Selection.	14. Enhanced Fertility.	14. Survival of the most Fertile.

Literature: C. Darwin, Origin of Species; and Animals and Plants under Domestication; A. R. Wallace, Darwinism; J. G. Romanes, Darwin and after Darwin; Poulton, Charles Darwin; J. Mark Baldwin, Ment. Devel. in the Child and the Race; Social and Eth. Interpret.; and Development and Evolution (1902); C. Lloyd Morgan, Animal Life and Intelligence; Habit and Instinct; and Animal Behaviour; A. Weismann, Germinal Selection; K. Pearson, Chances of Death; and Grammar of Sci. (2nd ed., 1900); J. Ward, as cited; Groos, The Play of Animals (Eng. trans.), and The Play of Man (Eng. trans.); Morselli, Antropol. gen.; Grosse, Selezione fen. psich.; the topics referred to. (C.Ll.M.)

Selection (method of): see Memory (experiments on).

Selection (in psychology; and **Selective Synthesis**): Ger. *Wahlvorgang* (selective process); Fr. *sélection*; Ital. *selezione*. The principle of selection is that out of all the manifold changes of sensory presentation which a given individual experiences, only a few are so related to pre-existing subjective tendencies as to secure lodgment in consciousness.

The objects which are thus selected must be such as can be connected with each other in the mind of the subject. This connection is called 'selective synthesis.' Hence selection in general involves selective synthesis, which is also variously called 'selective thinking,' 'mental determination,' &c.

The terrier pays no attention to a daisy, but it is keenly aware of the presence of a rat, and of all that belongs to the pursuit and killing of a rat. The timber merchant as such and the artist as such do not perceive the same features in a wooded landscape. In general, the world as it appears to the

individual subject is relative to his interest. Only those items in it which appeal to his interest are discriminated and related.

(G.F.S.–J.M.B.)

Theories of selection are: (1) that there is immediate fusion or union between new and old elements of experience by immanent laws of 'assimilation,' 'association,' &c., such as resemblance, non-contradiction; (2) that there is actual testing of all new items of experience, those being selected which are found to work; (3) that there is SYNERGY (q. v.) of motor processes which precedes and explains the assimilation of sensory content; (4) that there is a mass of dispositional tendencies—attention, interest, &c.—to which new items must in some way conform. These theories are not mutually exclusive; indeed, the last three are readily united into one—the motor or synergy theory—as against the first, which is the sensory or presentation theory. Cf. SELECTION (in biology), SELECTIVE THINKING, and RELATIVE SUGGESTION, and cf. PRAGMATISM.

In the higher grades of mind the attention is the selecting function, but in lower forms we still find objective signs of selection. So evident is this that it is currently held (Romanes, *Ment. Evolution*; Ll. Morgan, *Habit and Instinct*; Baldwin, *Ment. Devel. in the Child and the Race*) that this is the best criterion or test of the presence or consciousness in an organism—its 'selective' response to stimulation.

The principle of selective synthesis, or synthesis under the leading of selection, has been used to disprove associationism (James, Ward); it has also been invoked as evidence of a purely mental 'activity,' and again, of a mental substance or soul, of which this is the function of self-activity. Further, under the term SUBJECTIVE SELECTION (q. v., and cf. ORGANIC SELECTION), it has been made a philosophical principle (Ward, *Naturalism and Agnosticism*) and applied as well to the function of the organism in selecting its living environment, and so securing its own survival. The same process, looked at from an objective point of view, is termed 'conscious,' as opposed to 'unconscious' SELECTION (q. v., in biology).

Literature: see this topic, also the topics 'Consciousness,' and 'Apperception, in the Psychologies. Cf. BIBLIOG. G, i, *f*, and G, 2, *c*.

(J.M.B., G.F.S.)

Selection (social): see SELECTION, and SOCIAL SELECTION.

Selection (or **Selective**) **Value**: see UTILITY (in biology), and cf. SELECTION (in biology).

Selective Agents: see SELECTION (in biology).

Selective Synthesis: see SELECTION (in psychology).

Selective Thinking: Ger. (*das*) *auslesende Denken*; Fr. (*la*) *pensée sélective*; Ital. (*il*) *pensiero selettivo*. Used by the present writer (*Social and Eth. Interpret.*, and 'Pres. Address,' in *Development and Evolution*), for the 'systematic' or progressive and continuous determination of the stream of thought in the individual's mind.

For theories see SELECTION (in psychology), and PRAGMATISM, which latter includes the theory of selective thinking by the criterion of 'workability' or utility of the elements selected.

Literature: SIMMEL, Arch. f. system. Philos., i. 34; DEWEY, The Significance of the Problem of Knowledge, in Univ. of Chicago Contrib. to Philos., i; and Ped. Sem., v. 3 (Jan. 1898); BALDWIN, as cited; URBAN, Psychol. Rev., July, 1897, vi. 361. (J.M.B.)

Self [Lat. *se*]: Ger. *Selbst*; Fr. (1) *soi-même*, (2) *le moi*; Ital. (1) *l'io*, (2) *il me*. (1) The subject of the individual's consciousness or self-consciousness, and (2) the object of the individual's self-consciousness.

'That subject whose activity is the subject's object' (Volkmann, *Lehrb. d. Psychol.*, 4th ed., ii. 217).

Considered simply as subject of experience, whether simply the system of experience itself (Stout) or that to which experience is presented, the self is called the unreflective or primary self as opposed to the subject-self of self-consciousness.

In reflective consciousness the self is not only subject—the subject-self—but it is also object of its own reflection—object-self. The object-self, however, when thus made object, is at the same time identified with the subject-self, which is said to reflect. This peculiar fact, that the subject that reflects is at once also its own object of reflection, is the great mystery of philosophy and the basis of systems of speculative thought. Lotze sees in the fact of self-consciousness a case of identity in change which fulfils the demands of philosophy for an explaining principle of the world order. Kant and Herbart distinguished clearly the so-called empirical and rational selves, and based upon the distinction that between the noumenal or

real and the phenomenal ego. Recent analyses have held that the self-content is complex, and that the subject-self is in some way a fuller statement of the elements which at the same time go to make up the lesser content presented as the object-self (Bradley), or that the subject-self is an active attitude or tendency reacting upon the partial content of self which at the time arouses it (Baldwin). Herbart (*Lehrb. d. Psychol.*) has a classical analysis of the nature and growth of the concept of self. Other important statements are by James Mill and James Ward.

Apart from the interpretation of reflective self-consciousness, the empirical or object-self—called by James the 'me'—as opposed to the rational or subject-self—called the 'I'—has had full treatment by the psychologists, both as to its elements and to its genesis. Contemporary psychology has accepted the fact that the self-content is complex. The assertion of an absolutely simple and undecomposable self, revealed by intuition and made the object of knowledge, is now seldom heard, and when it is heard it is usually based upon a failure to distinguish between the 'me' and the 'I'; or, if not that, the reference is to the continuous subject which, by the terms of the distinction, can only be analysed by first converting it into an object, and thereby setting up another subject—which again defeats analysis.

Recently much has been made of the social factor in the development of the concept of self (especially by Royce and the present writers). It has been shown that the self-thought grows by imitation and suggestion, being gradually built up under the stimulus of the social life correlatively with the notion of the personal other-self or 'alter.' Cf. Ego, Alter, Socius, Ejection, and Introjection.

Literature: the histories of philosophy (their treatment of Descartes), and the great philosophers, notably Kant, Berkeley, Fichte; Herbart, Metaphysik, 'Ontologie'; Hume, Treat. on Human Nature, Pt. IV; Lotze, Metaphysics, Bk. I. chap. vii, and Bk. III. chap. i. On the psychology: James, Princ. of Psychol., i. chap. x; Royce, Spirit of Mod. Philos.; and Stud. in Good and Evil; Ardigò, L'unità della Coscienza, Op. Filosofiche, vii (1898); Bradley, Appearance and Reality, chaps. ix, x; Stout, Manual of Psychol.; Baldwin, Social and Eth. Interpret.; Mezes, Ethics Descrip. and Explan., chap. vii. For disturbances of self-consciousness, see Personality (disorders of). (J.M.B.–G.F.S.)

Self (feeling or emotion of): Ger. *Selbstgefühl*; Fr. *sentiment du moi, sentiment égotiste ou personnel* (see Ribot, *Psychol. des Sentiments*, 236—Th.F.); Ital. *sentimento di sè*. Feeling excited by the thought of self. Cf. Humility, Pride, and Shame. (J.M.B.)

Self (pathology of, alterations of, perversions of, &c.): see Personality (disorders of).

Self-activity: Ger. *Selbstthätigkeit*; Fr. *propre activité*; Ital. *attività propria* (or *autonoma*). (1) Change determined within a being without other conditioning factors, and without destroying the identity of the being; entirely immanent change.

(2) Such change within the psychic self.

The conception of self-activity is subject to all the embarrassments of those of cause and change. The term *causa sui* is the older way of designating it in its application to any sort of reality.

As used in current thought it is applied mainly to the mental self (2), and varies from pure accidentalism to a theory of relative Spontaneity (q. v.) in its interpretation of the activity involved, and from pure transcendentalism to sensational empiricism in its interpretation of the self involved. The definition given is the least that the term can mean; it leaves open the further questions as to what besides change activity may mean, and what besides an immanent principle of organization the psychic self may mean. Those who cannot allow even this may argue that there is no self-activity.

The identity of the self having the activity must be preserved in a case of self-activity. Yet it may well be a point of subtle discussion whether a self-active being can commit suicide. We might say in regard to the matter of predication that it is made on the strength of earlier exercises of this activity; but they would be cases, indeed, in which the being remained after the activity. We might say such an activity may be a development which spends itself, reaching an end-state at which it stops; but that would mean that such a development must have started; and how could self-activity start? Its first action would be due to something not itself; and if the first act was not self-activity, neither would the second be in which the first issued, nor the third, &c.

Furthermore, it is difficult to see what a psychic principle of self-activity could be. It could not be knowledge, since knowledge is in some degree conditioned upon its object;

nor volition, since volition involves ends which are, as knowledge, also objects; nor feeling, since feeling seems most of all under organic conditions. Probably a self-active mind could only be an absolute mind; and with it the question of its mode of self-determination would be open for discussion.

Literature: LOTZE, Metaphysics; HARRIS, The Logic of Hegel, and Psychol. Foundations of Education; ORMOND, Basal Concepts in Philos.; HOWISON, in Royce's Conception of God. (J.M.B.)

Self-consciousness: Ger. *Selbstbewusstsein*; Fr. *conscience de soi-même*; Ital. *coscienza di sè*. (1) The process or state of reflection on the self. See SELF, PERSONALITY (disorders of), and REFLECTION.

(2) Used popularly for the 'nervousness' or 'flurry' which comes from directing attention to one's own person or performances.

In this sense it is a manifestation of SHYNESS (q. v.). (J.M.B., G.F.S.)

Self-control: Ger. *Selbstbeherrschung*; Fr. *maîtrise de soi-même*; Ital. *dominio di sè stesso*. CONTROL (q. v.) exercised in social and moral relationships; it concerns not only the efficiency of volitions when formed, but also the process of forming them.

The volitions of the man who possesses self-control flow from full deliberation and express personal character as a unified system. Absence of self-control is marked by volitions flowing from detached and momentary impulses. (G.F.S.–J.M.B.)

Self-denial or **Self-sacrifice**: Ger. *Selbstverleugnung*; Fr. *sacrifice de soi-même*; Ital. *abnegazione, sacrificio di sè*. Voluntary relinquishment of something desirable which is within one's reach or which is thought to be one's right.

This is a fundamental conception of Christian ethics. It has two great illustrations: (1) the sacrifice of the lower to the higher self; (2) the sacrifice of self for others. In the former aspect it has sometimes been so exaggerated (by the Cynics and Stoics, and in mediaeval monasticism) as to make morality largely negative. Cf. ASCETICISM. On the other hand, the idea of SELF-REALIZATION (q. v.) gives a positive interpretation of self-sacrifice. In its second aspect, self-sacrifice is the presupposition of a genuine altruism or disinterested service of others, and in this sense it must be regarded as a distinctive and original principle of Christian ethics. Even here, however, as Mill points out (*Utilitarianism*, chap. ii), self-sacrifice is a means rather than an end-in-itself. Cf. Lecky, *Hist. of European Mor.*, chap. iv. (J.S.)

Self-determination: Ger. *Selbstbestimmung*; Fr. *détermination par soi-même*; Ital. *determinazione per sè* (or *interna*). The determination of volition by psychic elements alone.

Held by the theory of 'inner determinism,' which opposes the view of 'external determinism,' that elements of an extra-psychic kind enter into voluntary action. It holds that volition is always conditioned upon motives, dispositions, and other psychic events only, thus being opposed on the other side to INDETERMINISM or ACCIDENTALISM. See these terms, and WILL (also for literature). (J.M.B.)

Self-estrangement: Ger. *Selbstvergessenheit, Vertiefung*; Fr. (not in use); Ital. (*lo*) *straniarsi*. The process of sinking the mind in what is foreign or alien to its customary habit of thought, in order the more fully to absorb and assimilate the new experience.

Self-estrangement and its removal is the twofold process of culture. The commonplace soon fails as a stimulus to growth; the novel, the wonderful, the strange is demanded. As soon as any one of these appears, consciousness departs from its customary mode of activity, and sinks itself in contemplation of the new experience. The self is, in other words, estranged from its ordinary course of thought, only in the end to return to its normal state enriched by the treasures it has seized in its momentary departure from habitual modes of thinking. The estrangement may be the matter of an hour, a day, a year, or a college course. It has been held that the greater the self-estrangement and the longer its continuance, provided it is in the end fully overcome, the greater the culture. Thus a college student may spend years in the study of ancient languages and systems of thought, and yet be the stronger thereby, provided he fully assimilates what he learns, and is able to see its significance in modern life. Herbart appears to limit the process to the absorption and the reflection that are involved in actual instruction from day to day. See ABSORPTION, and REFLECTION (in education).

Literature: ROSENKRANZ, Philos. of Educ., 27; HARRIS, Psychol. Foundations of Educ., 240–7; HERBART, Sci. of Educ. (trans. by Felkin), 123. (C.De G.)

Self-evident: see EVIDENCE AND EVIDENT, Self-evidence under TESTS OF TRUTH,

and CLEAR AND DISTINCT; and cf. IMMEDIATE AND MEDIATE (3).

Self-exhibition: Ger. *Selbstdarstellung*; Fr. *parade, étalage de soi*; Ital. (*fare*) *mostra di sè, pompeggiarsi* (vb.). The display of one's own qualities or capacities before spectators, or as if before them.

Self-exhibition has been recognized in recent literature as a natural impulse, both spontaneous and reflective. In its spontaneous form it has been connected with the display of the animals—notably for sexual attraction, e. g. the male among birds (cf. SEXUAL SELECTION)—and with native bashfulness and COYNESS (q. v.) in the opposite sex (see also TIMIDITY).

Its value in the social life is very great, since it brings the characters of the individual to the attention of his fellows, and thus secures social recognition and response. In its higher forms—in which the actual audience is no longer necessary, but the self-exhibition is 'as if' before spectators—it has been considered one of the fundamental elements of the art-impulse (see ART AND ART THEORIES).

It would be well to designate the purely impulsive and instinctive forms of self-exhibition associated with mating by the term 'display,' which is already in use by the biologists (cf. RECOGNITION MARKS); reserving 'self-exhibition' for cases in which there is a more or less developed consciousness of self. The English term was suggested by the present writer (*Psychol. Rev.*, i, Nov. 1894, 620).

Literature: MARSHALL, Pain, Pleasure, and Aesthetics; and Aesthetic Principles; GROOS, Play of Animals, and Play of Man (Eng. trans. of each); HIRN, The Origins of Art, chap. xiv; BALDWIN, Social and Eth. Interpret.; the literature of SEXUAL SELECTION (notably DARWIN and WALLACE). (J.M.B.)

Self-interest: Ger. *Eigennutz*; Fr. *intérêt personnel*; Ital. *interesse proprio*. That which is conceived to be in some respect advantageous for self. Cf. INTEREST (2). (J.M.B.)

Selfishness: Ger. *Selbstsucht*; Fr. *égoïsme*; Ital. *egoismo*. Regard for one's own interests to a degree which prevents full recognition of the interests of others. Cf. SELF-INTEREST. (J.S.–J.M.B.)

As contrasted with egoism, selfishness relates to the practical evident utilities or gains accruing to the self through action. A man may be an egoist from absorption in self and in exclusive interests, to whom the term selfishness would not commonly be applied.

The reference to others is either positive or negative. Selfishness may show itself either in actual conduct or only in the omission of something which bears upon the interests of others. (J.M.B.)

Butler distinguishes 'cool or settled selfishness' from 'passionate or sensual selfishness.' His usual term for the former is SELF-LOVE (q. v.). 'But the most natural way of speaking plainly is to call the first only, self-love, and the actions proceeding from it, interested: and to say of the latter, that they are not love to ourselves, but movements towards somewhat external: honour, power, the harm or good of another; and that the pursuit of these external objects, so far as it proceeds from these movements (for it may proceed from self-love), is no otherwise interested than as every action of every creature must from the nature of the thing be: for no one can act but from a desire, or choice, or preference of his own' (Pref. to *Sermons*, § 29). For literature see SELF-LOVE. (J.S.)

Self-knowledge: Ger. *Selbsterkenntniss*; Fr. *connaissance de soi*; Ital. *conoscenza di sè*. Loosely used—as in the γνῶθι σεαυτόν of the oracle—for a more or less adequate apprehension of one's own capabilities. No technical use of the term is recommended. (J.M.B.)

Self-love: Ger. *Selbstliebe, Eigenliebe*; Fr. (*l'*)*amour de soi, égoïsme*; Ital. (1) *amor di sè*, (2) *amor proprio*. (1) The impulses to SELF-PRESERVATION (q.v.).

(2) Disposition to pursue the interests of self; the motive to EGOISM (q. v.).

In the first sense the term covers both the organic and the mental attitudes of an impulsive sort, prompting to self-preservation, called variously 'love of life,' impulse to 'self-defence,' 'conatus' (Spinoza), &c. It is only in the latter of the two senses given that self-love is a matter of ethical or religious sanction, although the distinction has not always been made in the history. (J.M.B.)

(2) Self-love is a sentiment having for its object the good of the self as distinguished from the good of others, leading to action intended to promote this good or to defend it, and to various emotions which are pleasurable in so far as the private advantage of the self is believed to be advanced, and unpleasant in the reverse case. (G.F.S.)

The Christian principle of self-sacrifice has often been so interpreted as to negate and condemn the principle of self-love or self-interest, as its opposite, and the root of all moral evil. The leading Christian moralists,

however, have distinguished between excessive and legitimate self-love, as Thomas Aquinas, who says: 'Every act of sin proceeds from an inordinate craving after some temporal good. This, again, proceeds from an inordinate love of self; for to love any one is to wish him good. Therefore inordinate love of self is the cause of all sin.' He quotes St. Augustine's saying that 'self-love, reaching to contempt of God, makes the city of Babylon' (*Summa*, I. ii. Q. 77, art. 4, Eng. trans. by Rickaby; *Aquinas Ethicus*, 240–1). On the other hand, 'There is a well-ordered self-love, due and natural, whereby a man wishes for himself the good that befits him; but the love that is set down as a cause of sin is an inordinate self-love, leading to a contempt of God' (loc. cit.). 'A man ought to love himself, after God, more than any other person' (ibid. II. ii. Q. 26, art. 4). It is only the good who can thus truly love themselves, for they alone truly know themselves, i.e. as rational beings, and they alone are worthy of love, i.e. as good, or partakers in the divine goodness (ibid. II. ii. § 25, art. 7). This true self-love, so far from contradicting the love of others, is its presupposition. 'As unity is the principle of union, so the love wherewith one loves oneself is the form and root of friendship: for our friendship for others consists in bearing them that regard which we bear ourselves' (ibid. II. ii. Q. 25, art. 4).

Butler similarly distinguishes rational, or reflective, from passionate self-love. Regard for our own interest or happiness is a no less rational principle of action, he holds, than regard for the interest or happiness of others (benevolence). Both principles are approved by conscience, since both are, like conscience itself, reflective principles. Butler also insists strongly upon the harmony of self-love and benevolence as moral principles, and upon the suicidal character of a self-love which should exclude the disinterested love of objects and of other persons. The true self-love sees in the satisfaction of the particular 'propensions' the only means of its own fulfilment, the only possibility of happiness.

For Kant, self-love or self-interest is the radical principle of evil, summing up as it does that life of natural inclination which opposes the life of duty. 'All the inclinations together (which can be reduced to a tolerable system, in which case their satisfaction is called happiness) constitute self-regard (Solipsismus)' (*Critique of Pract. Reason*, chap. iii. 197; Abbott's trans., 165). In a different and somewhat strained sense, Kant admits the possibility of a rational self-love. 'Pure practical reason only checks selfishness, looking on it as natural and active in us even prior to the moral law, so far as to limit it to the condition of agreement with this law, and then it is called rational self-love' (loc. cit.).

Spinoza defines self-love as 'the joy which arises from contemplating ourselves' (*Ethica*, Pt. III. Prop. 55, Schol.).

Literature: Aquinas, Spinoza, Butler, Kant, as cited; Spencer, Data of Eth.; Sidgwick, Pract. Eth.; Paulsen, Syst. of Eth. (Eng. trans.), 179 ff., 244 ff.; Wundt, Ethics, i; Baldwin, Social and Eth. Interpret., 20, 266, 286. (J.S.)

Self-preservation (impulses of): Ger. *Selbsterhaltungstrieb*; Fr. *conservation personnelle*; Ital. *conservazione propria* (or *individuale*). The group of feelings and dispositions connected with the maintenance and development of life.

The term instinct, often used, is less exact than impulse, for reasons given under Play, which presents analogous conditions. Apparatus and tendencies for self-preservation are recognized both in biology and in genetic psychology as fundamental natural facts. In biology it appears in rejuvenation and regeneration, in defensive reflexes, in special instincts, &c.; in psychology, in various emotional conditions such as anger, revenge, and the corresponding active tendencies.

Important special constructions using this principle are those of Herbart ('Selbsterhaltung der Realen') and Avenarius (theory of the 'vital series' and its 'Erhaltung'). Vitalistic writers carry the principle over to the inorganic world (Paulsen), and philosophers bring under the general concept of conservation (Erhaltung, Conatus, Trieb) such different principles as heredity, conservation of energy, and inertia. (J.M.B.)

Self-preservation has been accepted as a fundamental ethical principle by Spinoza and Hobbes, while its importance is also recognized by Shaftesbury, Clarke, and Adam Smith. Spinoza sees in the *perseverare in esse suo* the universal *conatus* of existence, and finds in this principle the clue to virtue. 'Since reason demands nothing which is opposed to nature, it demands, therefore, that every person should love himself, should seek his own profit—what is truly profitable to him—should desire everything that really leads man to greater perfection, and absolutely that every one should endeavour, as far

as in him lies, to preserve his own being. . . . Again, since virtue means nothing but acting according to the laws of our own nature, and since no one endeavours to preserve his being except in accordance with the laws of his own nature, it follows that the foundation of virtue is that endeavour itself to preserve our own being, and that happiness consists in this—that a man can preserve his own being' (*Ethica*, Pt. IV. Prop. 18, Schol.).

Hobbes gives the principle an absolutely egoistic interpretation, and sees in it the fundamental 'natural right.' 'The right of nature, which writers commonly call *ius naturale*, is the liberty each man hath to use his own power, as he will himself, for the preservation of his own nature, that is to say, of his own life; and consequently of doing anything which, in his own judgment and reason, he shall conceive to be the aptest means thereunto' (*Leviathan*, Pt. I. chap. xiv). 'Every man, not only by right, but also by necessity of nature, is supposed to endeavour all he can to obtain that which is necessary for his conservation.' 'The final cause, end, or design of men who naturally love liberty and dominion over others, in the introduction of that restraint upon themselves, in which we see them live in commonwealths, is the foresight of their own preservation, and of a more contented life thereby' (ibid., Pt. II. chap. xvii). All the 'laws of nature' are derived from 'the single dictate of reason advising us to look to the preservation and safeguard of ourselves.'

Shaftesbury distinguishes 'selfishness' or immoderate regard for private good, which is 'inconsistent with the interest of the species or public,' from such an 'affection towards private or self-good' as, 'however selfish it may be esteemed, is in reality not only consistent with public good, but in some measure contributing to it; if it be such, perhaps, as for the good of the species in general, every individual ought to share; 'tis so far from being ill, or blameable in any sense, that it must be acknowledged absolutely necessary to constitute a creature good. For if the want of such an affection as that towards self-preservation be injurious to the species, a creature is ill and unnatural as well through this defect as through the want of any other natural affection' (*Inquiry concerning Virtue*, Bk. I. Pt. II. § 2).

For Clarke, the principle represents the egoistic side of 'the rule of righteousness': 'With respect to ourselves, the rule of righteousness is, that every man preserve his own being as long as he is able, and take care to keep himself at all times in such temper and disposition both of body and mind as may best fit and enable him to perform his duty in all other instances. . . . That every man ought to preserve his own being as long as he is able, is evident; because what he is not himself the author and giver of, he can never of himself have just power or authority to take away' (*On Natural Religion*, Prop. 1).

According to Adam Smith: 'Self-preservation and the propagation of the species are the great ends which nature seems to have proposed in the formation of all animals.' Accordingly, man is endowed not only with 'a desire of those ends and an aversion to the contrary,' but also with an instinctive apprehension of the means necessary to their attainment (*Theory of the Mor. Sent.*, Pt. II. § 1, chap. v, note).

Spencer regards self- and race-preservation as the ends of conduct, viewed from the standpoint of evolution (*Princ. of Eth.*, Pt. I. chap. ii). (J.S.)

Literature: besides the writers cited above, see WUNDT, Logik, ii. 258; HERBART, Hauptpunkte d. Met., 42; AVENARIUS, Krit. d. reinen Erfahrung, i. 62 ff.; and the citations made under SELF-LOVE, and in EISLER, Wörterb. d. philos. Begriffe, 'Erhaltung.' (J.M.B.)

Self-realization: Ger. *Selbstverwirklichung*; Fr. *propre réalisation*; Ital. *svolgimento della propria personalità*. The fulfilment of the possibilities of development of the self. (J.M.B.)

The doctrine that the supreme end of conduct is self-realization or self-fulfilment is to be traced throughout the course of ancient and modern ethical thought. Its earliest and most important representative is Aristotle, for whom the good is the actualization of the human or rational soul. The Neo-Hegelians have brought the term 'self-realization' into prominence.

Literature: GREEN, Prolegomena to Eth., Bk. III. chap. ii; DEWEY, Outlines of Eth., Pt. I. chap. i; MACKENZIE, Manual of Eth.; MUIRHEAD, Elements of Eth. (J.S.)

Self-righteousness: Ger. *Selbstgerechtigkeit*; Fr. *propre justice*; Ital. *giustificazione di sè*. The attribution of RIGHTEOUSNESS (q. v.) to oneself.

Used in a derogatory sense, generally, for moral and religious pride. It is often made to include also an element of hypocrisy, as in the case of the Pharisee. (J.M.B.)

Semantics (or **Semasiology**) [Gr. *σῆμα*, a sign, + *λόγος*, discourse]: Ger. *Semantik*; Fr. *sémantique*; Ital. *semantica*. The doctrine of historical word-meanings; the systematic discussion of the history and development of changes in the meanings of words. Cf. SIGNIFICATION, SIGNIFICS, and MEANING.

The value of a word at any time is determined solely by its power to convey meaning in a speech-community. What is called the etymology of a word serves only to help explain how a present meaning came to be what it is. Changes of meaning are in general brought about through the interplay of the normal and the occasional or special uses of a word. When the occasional entirely displaces the normal then the change is complete. Thus *head* once meant 'prayer'; it might also be applied to a ball of the rosary. This latter special meaning ultimately displaces the normal. The range of the occasional values of a word differs greatly with different individuals and in different communities. The commonly accepted range is a resultant of compromises dictated by the necessities of intelligibility, and constitutes the meaning of the word. Words empty or uncertain of meaning to the ears of one or more individual speakers may assume for them a meaning suggested by something in their forms or connections; thus *parboil*, whose prefix (*per-*) originally meant 'much,' 'very,' came through false suggestion of *part* to its present value. See PHONETICS, and cf. LANGUAGE. (B.I.W.)

Locke (*Essay*, iv. chap. xxi. § 4) uses the term 'semiotic' (*σημειωτική*) in the somewhat broader sense of science of the use and meaning of words and signs in general. Further, the term 'semeiology' (also spelt 'semiology'), with 'semeiotic' (adj.), is used in medicine for the science of the signs or symptoms of disease. (J.M.B.)

Literature: PAUL, Principien der Sprachgeschichte (4th ed., 1899); DARMESTETER, The Life of Words (1886); TRENCH, Study of Words (20th ed., 1888); BRÉAL, Essai de Sémantique (Eng. trans., 1901); OERTEL, The Scient. Study of Lang., 70 ff., 278 ff. (B.I.W.)

Semasiology: see SEMANTICS.

Semblance [Lat. *similis*, like, through Fr.]: Ger. *Schein* (and in compounds, *Scheinthätigkeit*, &c.); Fr. *semblant*; Ital. *sembianza*. A general term for those mental contents which simulate the real, but do not prove to be it.

Under this heading we have the class of facts covered by the imaginative faculty when working under claim to cognitive validity, whether or not its claim be recognized as artificial and false by the subject. It has been called an 'inner imitation' of reality, in that it is—especially when its false claim is detected—a simulation of the marks of reality. This character is essential, and its nature appears more clearly in the cases distinguished below.

(1) The case of one extreme, 'conscious self-illusion' (bewusste Selbsttäuschung, K. Lange; illusion volontaire, Souriau); the indulgence in the temporary acceptance of a mental construction as real, with the knowledge, at the same time, that it is not. This is characteristic of much play and art enjoyment; one feature of which is that it throws the observer into a voluntary treatment of an artificial situation as real. Cf. SYMPATHY (aesthetic).

(2) The case of simple or actual ILLUSION (q. v.), in which the subject fails to detect the artificiality of the construction.

(3) The case of MAKE-BELIEVE (q. v., sense 1). In this, the construction has a social reference; the acceptance of it as real to another—an observer—is more or less clearly had in mind or intended, while the subject himself does not accept it as real. This distinction is important enough to be marked by a difference of terms; for while in the earlier cases—(1) and (2)—the acceptance of the construction by the subject carries with it usually also its validity to others as well—as notably in art—yet in them it is the self-illusion which constitutes the essential meaning of the experience.

(4) The other extreme case: feigning (cf. MAKE-BELIEVE, 3) without consciousness of causing illusion or misleading to another. This is the extreme or limiting case from the point of view of the mental life, because while it is semblance to the observer, it is not consciously so to the producer. Yet there is probably a colouring in consciousness corresponding to the quasi-social character of the state—as of lying in wait for, or of being gazed at by another—which is sufficient to allow its inclusion under the definition of semblance. The semblance here seems to be of biological utility, and to have arisen by natural selection.

The two extremes given in (1) and (4) represent an antithesis of points of view, as between psychology and biology, which is embarrassing in cases of other functions as well (e. g. imitation). What is

semblance to the observer may lack that character to the producer; this comes out notably in the cases of play and art (for note of it in the former case, see PLAY). Cf. Groos, *Play of Man* (Eng. trans.), Introd., and especially 325, and *Play of Animals* (Eng. trans.) in loc. and in the Preface by Baldwin, ix.

The terms semblance and appearance (Schein and Erscheinung) are also used in epistemology for that which seems or appears only, in contrast to that which also satisfies the demands of thought or real existence: a distinction covered by the terms PHENOMENON (q. v.) and NOUMENON (q. v.). On this meaning see the citations in Eisler, *Wörterb. d. philos. Begriffe*, 'Schein.' See also KANTIAN TERMINOLOGY, Glossary, 'Schein,' and 'Erscheinung.'

Literature: citations given under PLAY, ART IMPULSE, and ART, notably the works of K. LANGE, v. HARTMANN, and GROOS. See also SOURIAU, La Suggestion dans l'Art (1893); HIRN, The Origins of Art, 118 (with citation from Jouffroy, 80). (J.M.B., G.F.S.)

Semeiology and **Semeiotic**: see SEMANTICS.

Semi- or **Half-conscious**: see SUBCONSCIOUS.

Seminal Reasons [Lat. *rationes seminales*, trans. of Gr. λόγος σπερματικός]. The forces, lodged in matter, by which natural effects result; active powers of nature, like heat and cold.

It is in virtue of them that the indefinite series of changes take place; they are, after being implanted in nature by God in the original act of creation, the causes of all subsequent combination and differentiation. They find their highest form of expression in the sex-process. As intermediary in the process of natural change and evolution, they are the media by which a universal is differentiated into individuals; these, however, in their specific nature, remain true to their genus. A scholastic term and concept. Cf. Harper, *The Philos. of the School*, ii. 731–2, iii. 412–13. See LOGOS, and REALISM.

The theory of λόγος σπερματικός found its way into Augustine under the form of the *ratio seminalis*; it was then taken up into the theory of creation by St. Thomas Aquinas, from whom the definition given is derived. The immediate creation had its cause in God, and had accordingly imparted to it the power of continuing the process of creation into the multiplicity of orders, genera, and species (and in the sex-processes) of individuals. See references to St. Thomas in the passages of Harper referred to. (J.D.)

Semiology and **Semiotic**: see SEMANTICS.

Semi-Pelagianism: Ger. *Semi-Pelagianismus*; Fr. *semi-pélagianisme*; Ital. *semi-pelagianismo*. A proposed compromise between the opposing systems of Pelagianism and Augustinianism, in which the freedom of the human will is maintained in connection with a modified doctrine of human ability, by virtue of which the necessity of co-operant grace is admitted as a condition of man's salvation. See PELAGIANISM.

In spite of the great part which Semi-Pelagianism has played in the doctrinal history of the Christian Church, it nevertheless seems to be infected with the inherent weakness of compromises in general. As a doctrinal position, it embodies no new spiritual insight. It would seem necessary, in order to attain a real ground of unity between the opposing views, to reach some conception of the relation between the divine and human agencies which would harmonize them without involving the virtual suppression of either.

Literature: see AUGUSTINIANISM, PELAGIANISM, ARMINIANISM, and JANSENISM. (A.T.O.)

Seneca, Lucius Annaeus. (cir. 4 B.C.–65 A.D.). Born at Corduba, Spain, he was educated at Rome, his father being a man of literary tastes, wealth, and influence. Trained especially in rhetoric. Travelled in Greece. Practised oratory in Rome with great success. Banished to Corsica, 41–9 A.D. Became tutor, 49 A.D., to Domitius (afterwards Emperor Nero), the son of Claudius. Most of his literary activity belongs to this period. Consul in 56 A.D. Committed suicide at Nero's order, 65 A.D. See 'Stoics' under SCHOOLS OF GREECE, III.

Senescence [Lat. *senescere*, to grow old]: Ger. *Greisenhaftigkeit, Senescenz*; Fr. *sénescence*; Ital. *senescenza, senilità*. The physical and mental changes attendant upon old age.

No definite age can be set for the beginning of senescence, but it may be said in ordinary cases to begin between fifty-five and sixty years for women, and between sixty and sixty-five for men, such years being fixed relatively to the termination of full sexual vigour. The physical symptoms of old age are many and characteristic; a general tendency to atrophy is observable and the diminution of elasticity of the blood-vessels (termed arterio-sclerosis) is a most important change. On the mental side the senses lose their delicacy, sight and

hearing being particularly affected. The memory becomes weaker, especially for recent events; apathy and weakness of will, lack of originality and receptiveness are apparent. 'Physiological senility typically means no reproductive power, greatly lessened affective faculty, diminished power of attention and memory, diminished desire and power to energize mentally and bodily, lower imagination and enthusiasm, lessened adaptability to change, greater slowness of mental action, slower and less vigorous speech as well as ideation' (Clouston). Apart from these normal changes there are psychoses especially characteristic of old age. The organic rather than the functional psychoses are typical of this period. In senile insanity heredity is a relatively small factor; for those with marked hereditary neurosis are apt to exhibit mental abnormality in earlier periods of life. An early senility is itself frequently a mark of a neurotic diathesis.

In senescence there is a strong tendency to chronic, progressive decline, and the insanities of old age approximate to the dementia type. The term 'senile dementia' refers to the typical psychosis of this form (see DEMENTIA). Insanities with a marked sexual aspect, delusions of suspicions concerning property, transitory deliria, and progressive mental deterioration, are typical characteristics in senile insanity. Cases of senile insanity, however, vary considerably in their symptoms; some are depressed and melancholic, the grief being often of an automatic type and not deeply felt inwardly; others are maniacal and subject to sudden outbursts of homicidal or destructive tendencies; while motor restlessness, constant motion with little rest or sleep, is a very typical symptom. Throughout, a forgetfulness, lack of appreciation of one's surroundings, degradation of habits, accompany the progressive dementia of the insane dotard.

Literature: NOTHLI, Ueber die Dementia senilis (1895). (J.J.)

Sensal [Lat. *sensus*, a sense]. (1) SENSUOUS (q.v., also for foreign equivalents); belonging to or derived from sense.

J. Grote speaks (*Explor. Philosophica*, ii. 156, 158) of 'sensal' intuition and knowledge; he used also the term sensive.

(2) Concerned, not with the sound or form, i.e. the strictly verbal character of a word, sentence, or question, but with its import or purport.

Aristotle's division of definitions into 'verbal' and 'real' might be more properly translated 'sensal' and 'real.' So in J. S. Mill's contention (*System of Logic*, chap. vi. § 4) that 'an essential proposition . . . is one which is purely verbal,' i.e. concerned merely with the sense in which it is used, 'verbal' would become 'sensal.' This meaning is suggested by the present writer. Cf. VERBAL (also for foreign equivalents for meaning 2). (V.W., G.F.S.)

Sensation (1) and (2) **Sense** [Lat. *sensus*, a sense]: Ger. (1) *Empfindung*, (2) *Sinn*; Fr. (1) *sensation*, (2) *sens*; Ital. (1) *sensazione*, (2) *senso*. (1) That mode of consciousness which can only be accounted for by the present operation of an external stimulus upon the nervous system, or some equivalent condition.

(2) The specialized nervous apparatus and psychological process by the stimulation of which qualitatively distinct sensations are produced. Cf. SENSE ORGAN.

The verb form 'to sense' is sometimes used with the meaning to apprehend by sensation. The term 'sense process' is applied to the psychophysical function involved.

The word equivalent in the definition of sensation keeps the definition to those psychophysical processes which are normally due to actual stimulation, though in certain cases, such as sense illusions, delirium, &c., the stimulus may not be present. It excludes the cerebral processes belonging to reproductions, images, &c., aroused normally in the absence of peripheral stimulation. To call the mental states associated with these latter processes 'cerebrally initiated sensations,' as is done by certain recent writers (Külpe), is to destroy a valuable historical distinction which has been maintained with fair consistency from the beginning of psychological inquiry.

The use of the term sense as equivalent to consciousness, as in the phrases 'time-sense,' 'sense of responsibility,' &c., is confusing and inaccurate.

The purely psychical characters of sensation, considered without reference to the conditions of its production, are treated under the topics PERCEPTION, IMAGE, and SENSORY ELEMENTS. The definition here given, though it is not strictly psychological, forms a good starting-point for further discussion. Cf. QUALITY, VIVIDNESS, PSYCHOPHYSICS, and the different sense topics, HEARING, VISION, &c.

(G.F.S.–J.M.B.)

Sensationalism [Lat. *sensus*, a sense]: Ger. *Sensualismus*; Fr. *sensationisme* (*sensualisme* is often used, as is its English equivalent —J.M.B.); Ital. *sensismo*. The theory that all knowledge originates in sensations; that all

cognitions, even reflective ideas and so-called intuitions, can be traced back to elementary sensations.

Historically, it is generally combined with ASSOCIATIONALISM (q. v.). In an ethical sense (for which, however, in English the term sensualism is more often used) it means that all moral values, or goods, are ultimately reducible to states of feeling which, psychologically, determine the will: Epicureanism.

In the first place it is a theory of the *origin* of knowledge, yet since questions arise (*a*) as to whether truth and certainty exist beyond sensation (in the derived forms), or are restricted to sensation, and (*b*) whether any truth can be found in purely immediate sensation, it comes to be also a theory regarding the validity of knowledge-forms, and as such is often used as synonymous with EMPIRICISM (q. v.).

Some of the Sophists (Protagoras, in particular, to all appearance) applied the conception of Heraclitus, that all is becoming, in such a way as to give validity, on the side of the knowing process, only to that which is in itself changing and partakes of motion, viz. sense. (But this may be merely the Platonic interpretation in *Theaetetus*.) Aristippus, the founder of the Cyrenaic school, taught most definitely that our knowledge is restricted to sensations. The Stoics asserted the idea of the origin of knowledge in sensations, but not its restriction to them. With them originated the famous simile that the soul is at first a blank tablet (see TABULA RASA) on which the outer world imprints its signs (Windelband, *Hist. of Philos.*, 203).

While the Stoics gave validity to the general ideas which result from perceptions, especially to those ideas which develop in all men alike, the Epicureans held that certainty is found conjoined with the necessity and clearness with which sensations force themselves upon us.

Some of the Latin fathers adopted this sensationalism as a basis for dogmatic orthodoxy. Since the soul in itself is limited to sensations, it cannot acquire the idea of God, salvation, or immortality. Hence the need of revelation to make known and valid these ideas. The Neo-Platonic and Scholastic philosophy universally admits a rational knowledge over and above sensation (in some Nominalists, however, the individual or real appears to have been identified with the individual presented to sense; but this doctrine left next to no impress). Hobbes is the founder of modern sensationalism, which he conjoined to his theory of moving body as the seat and the source of all sensation. Locke holds to reflection, besides sensation; the former gives us knowledge of our own or inner powers, like memory, judging, &c.; but sensation is the sole source of knowledge of the external world. In three ways Locke's sensationalism was highly influential in settling the problems of later epistemology. (*a*) He taught the doctrine of 'simple ideas,' or elementary sensations. While he himself attributed positive value to relations, and to general ideas (at least in mathematics), his standpoint raised the question of the possibility and value of relations, and led Hume to his scepticism —to his substitution of the subjective principle of habit for the objective principle of causality. (*b*) He assumed (after the manner of Hobbes, but with less emphasis upon motion) atoms as the real ground and cause of sensations; but was logical enough to see that if our knowledge is limited to sensation, their existence can be asserted only hypothetically— though it was rather substance or substrate (whose relationship to physical atoms he seems never to have fairly faced) the existence of which is inferential, as the *unknown* cause. Hence the problem of reconciling physical science and sensationalism. (*c*) He defined knowledge as agreement (relationship) of ideas, and yet, in places, limited *certain* knowledge to the immediately experienced sensation. Hence the problem of knowledge as judgment, and the relation of this to sensation. While the French school, through the influence of Voltaire and Condillac, translated Locke's wavering sensationalism into a thoroughgoing system, and made it the fashionable philosophy of the ENLIGHTENMENT (q. v.), it is Hume who, realizing the epistemological and metaphysical consequences of it, continues the main line of thought. Kant, stirred directly by Hume, revises the empiricism of one period of his thought, gives up his naïve assumption that the object as such can be given in sense, and reduces sense to one co-ordinate factor in knowledge, that which gives its matter, which, however, is chaotic and disconnected till acted upon by the forms of sense and the categories of the understanding. While it is perhaps too much to say that, since his time, sensationalism is a historic anachronism (since, for example, Spencer holds it and even tries to combine it with the results of physical science), yet it is certain that he weakened greatly the concep-

tion of the origin of knowledge through atomic, disconnected sensations; and, for the most part, 19th-century sensationalism is simply a popular survival of the philosophy of the Enlightenment. (J.D.)

Sense: see SENSATION, and SIGNIFICATION; and cf. SIGNIFICS (1, *a*).

Sense (spiritual): Ger. *geistiger Sinn*; Fr. *sens spirituel*; Ital. *senso spirituale*. A function thought to be analogous to ordinary sensation, by which the soul is alleged to apprehend spiritual truth immediately.

The existence of a spiritual sense, different from the ordinary forms of cognition, is held by religionists of the mystical school generally, and as uniformly denied by those of scholastic and naturalistic tendencies. In one form it seems to be involved in the Christian doctrine of the new birth. Jonathan Edwards, in his sermon on Spiritual Light and in other places, calls it a 'sense of the heart,' and ascribes to it the perception of spiritual beauty or excellence. (A.T.O.)

Sense Discrimination: Ger. *Unterschiedsempfindlichkeit*; Fr. *discrimination, sensibilité aux différences*; Ital. *sensibilità di differenza* (or *distintiva*—E.M.). A term used by Fechner to cover the introspection of different sense-experiences and the apprehension of their difference.

We speak of a qualitative, intensive, extensive, and temporal sense discrimination, as we speak of a qualitative, &c., SENSIBILITY (q. v.). The aim of all measurements of it is the ascertainment of the difference threshold, or the apparent equality of two stimulus differences, just as the aim of all measurements of SENSIBILITY (q. v.) is the ascertainment of the stimulus threshold, or the apparent equality of two stimuli. Cf. DIFFERENCE (method of least noticeable).

Literature: FECHNER, Elem. d. Psychophysik, i. (1889) 47; G. E. MÜLLER, Zur Grundl. d. Psychophysik (1878), 1; KÜLPE, Outlines of Psychol., 31, 48 f.; WUNDT, Physiol. Psychol., i. (1893) 336; FULLERTON and CATTELL, The Perception of Small Differences. Cf. PSYCHOPHYSICAL MEASUREMENT METHODS. (E.B.T.)

The form 'sensible discrimination' is used by E.B.T., who however personally prefers 'differential SENSITIVITY' (q. v.), but it is not endorsed by the other authorities of this work. It is recommended that 'sense' be used generally instead of 'sensible'—meaning pertaining or belonging to the senses—as in the terms 'sense experience,' 'sense perception,' &c. (J.M.B., G.F.S., H.C.W.)

Sense Illusion: Ger. *Sinnestäuschung*; Fr. *illusion des sens*; Ital. *illusione dei sensi*. Constant errors of sense perception.

Such illusions frequently arise from the nature of the sense apparatus, and are thus distinguished as a class from ILLUSION (q. v.) in general, which is a mistaken mental construction. They are also normal and regular, and thus common to different individuals, though not always of the same magnitude nor invariably present. Certain great cases, such as OPTICAL ILLUSIONS (q. v.) of form, ILLUSIONS OF MOTION AND MOVEMENT (q. v.), illusions of colour CONTRAST (q. v.), &c., lie on the borderland, and theories assign them variously to one class or the other. In case sense illusions are included in the larger category, it will still remain true that they are distinguished as phenomena of common and constant character, largely independent of mental context.

Literature: as given under HALLUCINATION, and under the topics cited; also TANZI, Riv. di Patol. Nerv. e Ment., 1901. (J.M.B., H.C.W.)

Sense Intuition: see INTUITION (1).

Sense Organs: Ger. *Sinnesorgane*; Fr. *organes des sens*; Ital. *organi dei sensi*. Mechanisms specialized for the reception of the different stimulations of sense, called also peripheral END-ORGANS (q. v.). (C.F.H.)

Sense Process: see SENSATION (2).

Sensibility: Ger. (1) *Empfindlichkeit, Sensibilität*, (2) *Empfindsamkeit*; Fr. *sensibilité*; Ital. *sensibilità*. (1) The abstract term corresponding to the more concrete name sensation, and properly signifying the capacity of experiencing sensations.

(2) Used also in a more popular sense for susceptibility to pleasure, pain, and emotion, with special reference to the comparative readiness with which these states are induced and the intensity which they assume in different individuals.

(3) Equivalent to AFFECTION (q. v.).

The usage given first is recommended: see, however, under SENSITIVITY. (J.M.B., G.F.S.)

Sensibility (disorders of): Ger. (*Störungen der*) *Empfindlichkeit*; Fr. (*troubles de la*) *sensibilité*; Ital. (*disturbi della*) *sensibilità*. For definition see SENSIBILITY (1).

Disorders in the field of sensibility are generally described according to the special sense affected: see HEARING (defects of), VISION (defects of). Of these sight and hearing offer the most variable as well as the most usual instances. Absence of smell or of taste, or a limited range or perverted action of smell

or taste is relatively infrequent. Abnormal conditions of the skin and the tissues concerned in yielding sensations of movement are often called disturbances of SENSIBILITY, ANAESTHESIAS, and PARAESTHESIAS (see those terms); while disturbances of general sensibility refer more particularly to unusual sensations from the viscera and the complex of subconscious impressions which influence the sense of well- or ill-being. Painful and unpleasant feelings are particularly to be considered in this group.

Regarding abnormalities of sensibility common to all senses it may be noted that they fall into (*a*) cases of increased excitability or hyperaesthesia, a condition in which a stimulus much slighter than would ordinarily arouse consciousness is perceived, or in which ordinary stimuli are perceived with unusual vividness, and degrees of stimulation, ordinarily not unpleasant, become painful; (*b*) cases of more or less marked dulling of sensibility, or, when partial, hyperaesthesia; when complete (or not rigidly specified), anaesthesia, a condition the reverse of the former; (*c*) cases of disturbed or perverted sensibility or paraesthesia, a condition in which stimuli produce an unusual or morbid effect, or in which subjective or false sensations arise. SYNAESTHESIA (q. v.) is a name given to unusual associations between sense impressions whereby, e. g., the sound of a fife when heard will arouse the appearance of a blue colour. The typical abnormalities of sensibility may be of a permanent character and be due to organic causes, but functional and temporary disorders of sensibility form a very numerous class.

Organic defects may depend upon disease or injury or faulty development of (portions of) the terminal sense organ or their accessory parts; upon interruption to the normal conductivity of the sensory nerve; or upon disorders of the centres; while in functional disorders the action of one or other of these elements is interfered with either by specific nervous disturbance or indirectly by a defect in the quality or quantity of nutritional blood-supply. Blindness may be due to opacity of the cornea, to a destruction or alteration of the rod and cone layer of the retina, to a degeneration of the optic nerve, or to injury to the central nervous system; and a similar range of causes of deafness or of tactile anaesthesia may be demonstrated. Colour-blindness is a good instance of a more special defect due to some unknown modification of terminal (or central) elements, while HEMIANOPSIA (q. v.), deafness for low or high tones only, and anaesthesias in limited skin areas, illustrate partial sense defects. Disturbances of sensibility must be distinguished from erroneous inferences based upon them; i. e. from illusions and hallucinations; although the distinction is not always easy to draw and many forms of illusions involve and depend upon a sensory factor. The apparent bending of a spoon, half immersed in water, the doubling of a pea rolled between the crossed fingers, involve no disturbance of sensibility; but this can hardly be said of negative after-images, of the apparent coldness of lukewarm water to the hand that has just been in hot water, and so on. These normal variations of sensibility in the same individual are well recognized. The variations between individuals are no less so, and appear in the results of tests made upon any considerable number of individuals. Subnormal and supernormal efficiency, with regard to any sense, may thus be readily established. It is also essential to distinguish between abnormal and disordered power to respond to a stimulus, and a similar incapacity or difficulty in distinguishing between slightly different stimuli. See TESTS (psychophysical).

Among disorders of sensibility, not affecting the more usually recognized special senses, may be mentioned disorders of the muscular sense, or muscular anaesthesia (see ATAXIA), whereby the ordinary sensations which direct movement are interfered with, or whereby a movement when made gives no report of itself (except through the eye); and disorders of the sense of equilibrium producing various forms of dizziness. The various pains accompanying illness, such as intestinal pressure, heartburn, headache, pains of inflammation, bruises, swellings, ulcerations, &c., contribute more or less unusual forms of sensation. The sensations of cold perspiration, of blushing, of shivering or creeping of the skin, of chill and fever, of thirst and hunger, suggest other forms of general sensibility, which may present abnormal conditions in disease. The rôle of such sensations, when subjectively aroused in shaping illusions or HALLUCINATIONS (q. v.) in insanity, is an important one. (J.J.)

Sensible: see SENSE DISCRIMINATION, ad fin.

Sensible Discrimination: see SENSE DISCRIMINATION.

Sensilla: see ANTENNA.

Sensitive: see MEDIUM; and cf. PSYCHIC RESEARCH.

Sensitiveness [Lat. *sensus*]: Ger. (1) *Reizbarkeit*, (2) *Erregbarkeit*; Fr. *nature sensitive*; Ital. *natura sensitiva, eccitabilità*. (1) Excitability, nervous or mental.

The term is more properly limited to mental responsiveness to stimulations, especially to those of the affective order; the term irritability is better for nervous excitability.

(2) Delicacy of appreciation and response to situations, statements, &c., having a possible personal reference, covering SENSIBILITY (2). (J.M.B.)

Sensitivity [Lat. *sentire*, to know, perceive]: Ger. *Empfindlichkeit*; Fr. *sensibilité*; Ital. *sensibilità, sensitività*. The capacity of experiencing and communicating sensations. The writer suggests 'liminal sensitivity' as contrasted with 'differential sensitivity' [which he suggests for SENSE DISCRIMINATION (q.v.)—J.M.B.].

It may be subdivided into (*a*) *modal sensitivity*, which is measured by the number of sensations given with (or possible to) a particular sense, and (*b*) *sensibility*, which is measured in terms of the attribute predicable of the separate sensations.

Thus the modal sensitivity of the skin is determined when we have discovered and tabulated all the simple sense-qualities that can arise from cutaneous stimulation (pressure, warmth, cold, pain). Where there are a large number of such qualities, forming a sense-series (as in the cases of sight and hearing), we must determine further the limits of sensation-arousal (liminal and terminal sensitivity). Sensibility is divided into qualitative, intensive, extensive, and temporal sensibility. Thus it would be a test of qualitative sensibility to ask how many air-vibrations are necessary to the qualitative identification of the tone to which their period corresponds. If the test is one of discrimination of sensations within the limits of modal sensitivity, we speak of the SENSE (or 'sensible'—E.B.T.) DISCRIMINATION (q.v.) of qualities, intensities, &c. See also THRESHOLD, LIMEN, and PSYCHOPHYSICAL MEASUREMENT METHODS.

Literature: KÜLPE, Outlines of Psychol., 33 ff.; GALTON, Inquiries into Human Faculty (1883), 30. (E.B.T.)

It would seem to be impossible, as well as inadvisable, to change the meaning of the term SENSIBILITY (q.v., 1). It is not only historically fixed in English (it is universal in pathological treatises), but it is the recognized translation of Empfindlichkeit. It would accordingly be preferable to make sensibility the broader and 'sensitivity' the narrower term, if it be deemed advisable to fix the narrower meaning by a special word. The present writers do not see the need of the two terms, as distinction of 'quality'—as well within the same as between the different senses—is both adequate and true to the facts.

(J.M.B., G.F.S., H.C.W.)

Sensori-motor: Ger. *sensorimotorisch*; Fr. *sensori-moteur*; Ital. *senso-motorio*. Applied to action considered as following upon sensation. Cf. IDEO-MOTOR. (J.M.B.)

Sensorium [Lat. *sensus*, sense]: Ger. *Sensorium*; Fr. *sensorium*; Ital. (1) *sensorio comune*, (2) *sensorio*. (1) The grey matter of the cerebral cortex, the supposed physical seat of mental processes.

(2) In general, the whole sense-mechanism of the organism; the nervous system with its sensory attachments. (E.B.T.)

The use of this term is not recommended. (C.L.F., J.M.B.)

Literature: for the word see DARWIN, Expression of Emotions (ed. 1890), 69; CARPENTER, Ment. Physiol. (1888), 109 ff.; LEWES, Physiol. of Common Life (1860), chap. viii. On the seat of consciousness see WALLER, Human Physiol., 503; FOSTER, Textbook of Physiol., Pt. III. 1117, 1118; BASTIAN, Brain as Organ of Mind, 589 ff.; SPENCER, Princ. of Psychol., esp. i. chap. vi; SULLY, The Human Mind, i. 48 ff.; FLECHSIG, Gehirn u. Seele (1894 and 1896); WUNDT, Physiol. Psychol. (4th ed.), i. 213 ff.; EBBINGHAUS, Psychologie, i. 23 ff., 150 ff. (E.B.T.)

Sensory: Ger. *sensorisch*; Fr. *sensitif, sensoriel*; Ital. *sensoriale*. See MOTOR, and SENSORY AND MOTOR ELEMENTS.

Sensory Circle: Ger. *Empfindungskreis*; Fr. *cercle de sensation*; Ital. *circolo sensitivo*. The area within which it is impossible to distinguish two aesthesiometric compass-points as two. (E.C.S.)

This cutaneous area, it was supposed, contained the ramifications of a single nerve-fibre. The concept was used by E. H. Weber to explain his aesthesiometric results. See his 'Tastsinn u. Gemeingef.,' in *Wagners Handwörterb. d. Physiol.*, III. ii. (1846) 527; Sanford, *Course in Exper. Psychol.*, expt. 7; Wundt, *Physiol. Psychol.* (4th ed.), ii. 13.

It was also supposed to give the unit of local signature upon the skin; see LOCAL SIGN. Cf. Wundt, *Physiol. Psychol.* (4th ed.), ii. 36, 39.

The term is also used of the retina. Cf. C. du Bois-Reymond, *Ueber d. Zahl d. Empfindungs-*

kreise in d. Netzhaut, Diss. (Berlin, 1881), and Wundt, *Physiol. Psychol.* (4th ed.), ii. 101, 105. (E.B.T.)

Recent investigations, however, which show the extreme relativity of the area as thus determined, have tended to discredit both of the suppositions mentioned above. See Tawney, *Philos. Stud.* (1897), xiii. 163 ff., also in *Princeton Contrib. to Psychol.* (1897), ii. 1 ff., and *Amer. Natural.* (1897), xxxi. 820 ff.; Tawney and Hodge, *Psychol. Rev.* (1897), iv. 591 ff.; Henri, *Rev. Philos.* (1897), xliii. 333 ff. (J.M.B.)

Sensory (1) and (2) **Motor Elements**: Ger. *sensorische und motorische Elemente*; Fr. *éléments sensoriels et moteurs*; Ital. *elementi sensoriali e motori*. (1) Those qualities of presentation which can only be accounted for by tracing them to the present or previous operation of an external stimulus. A mental image is composed of sensory elements, although it arises independently of the present operation of an external stimulus.

Both the percept as such and the image contain sensory elements. In the case of the percept the sensory elements are present in the form of actual sensations, involving the present operation of an external stimulus or some equivalent condition. In the case of the image the sensory elements are the reproduced qualities of previous sensational experience. When I look at a red cloth with my bodily eye, I have an actual sensation of redness. When I afterwards mentally call up the image of the red cloth, the redness is again present to consciousness in its peculiar and distinctive quality. It is a sensory element, though not an actual sensation. It should be noted that thinking of a sensation or sensible quality by no means implies the presence in consciousness of a corresponding sensory element. People can think of red or blue who have no power of visualizing these colours. They can attach distinctive meanings to the words red or blue without *imaging* these sensible qualities as such. (G.F.S., J.M.B.)

(2) Sensory elements which arise from the function of the Motor (q. v.) apparatus.

It is convenient to preserve the distinction between sensory and motor elements; but their essential nature—that of being sensational—is the same. The sensations coming from movement may thus be separated off. (J.M.B., G.F.S.)

Sensual: see Sensuous and Sensual.

Sensualism: Ger. *Sensualismus*; Fr. *sensualisme*; Ital. *sensualismo*. Any form, theory, or practice which sets high value upon, or issues in, (1) the sensual, (2) the Sensuous (q. v.).

The first is the legitimate meaning; the proper designation for the second is Sensationalism (q. v.), which has largely replaced sensualism in English; Sensualismus still appears more regularly in German, however. (J.M.B.)

Sensualism (in aesthetics). Emphasis upon the sensuous element in the aesthetic object, and the derivation of aesthetic value principally from this element (e. g. colour, tone, &c.).

It is contrasted, from different points of view, with Formalism, Intellectualism, and Idealism (see those terms). The term may be applied to the view of Allen (*Physiol. Aesth.*, 1877).

Literature: see under the topics cited above. (J.H.T.)

Sensualism (in ethics). The popular use of the term is to denote a low or depraved form of moral theory, according to which indulgence in the more gross forms of pleasure is made the chief end of life. (J.D.)

Sensuous (1) and (2) **Sensual** [Lat. *sensus*, sense]: Ger. (1) *sinnlich*, (2) *fleischlich*; Fr. (1) no single term, (2) *sensuel*; Ital. (1) no single term, (2) *sensuale*. (1) Pertaining, belonging, or appealing to the senses; often equivalent to sense- (in compounds) and to Sensory (q. v.).

(2) Pertaining, appealing, or ministering to what is fleshly and unchaste, especially to the sexual.

These words are often confused, sensual being misused for sensuous; e. g. by Dabney, *Sensualistic Philos. in the 19th Century*, and by the translator of Ziehen, *Introd. to Physiol. Psychol.* (1st ed.). (J.M.B.)

Sentence Method: see Word Method, and Alphabet Method.

Sentience [Lat. *sentiens*, from *sentire*, to feel]: no single foreign terms. (1) The reverse of the meaning below, sentience being elementary consciousness, and sensibility the correlative nervous process.

(2) The nervous function which attaches peculiarly to consciousness; the physical basis of sensibility; the central nervous process supposed to be due to an activity of the cells of the grey matter of the brain.

The first usage is that of Lewes (*Physical Basis of Mind*, 222; cf. also Sergi, *Psychol. physiol.*, 12); the second was suggested by the present writer (*Handb. of Psychol., Feeling*

and Will, chap. ii). It seems, however, somewhat strained to use either term, sentience or sensibility, of nervous action. NEUROSIS (q.v.) is being used, but generally in too restricted a sense. If both sentience and sensibility be preserved, the former should in all cases be carefully defined: possibly it were better to drop it as a technical term. (J.M.B.)

Sentiment [Lat. *sentire*, to feel]: Ger. *höheres Gefühl*; Fr. *sentiment* (*esthétique*, &c.); Ital. *sentimentalità*. An emotional disposition having reference to an object or class of objects represented by a more or less complex system of ideas. See DISPOSITION, and cf. PASSION.

A sentiment cannot be felt all at once. It is a general susceptibility to manifold kinds of emotion varying with circumstances. Thus friendship is a sentiment, and is manifested in the sorrow of parting with one's friend. The joy of meeting him after prolonged separation, jealousy of those who engross his interest so as to exclude us from it, hope for his success, fear when he is in danger, anger against his enemies—all these emotions belong to the sentiment of friendship. But they cannot all be felt at once. On the other hand, not all emotional dispositions are sentiment, but only those which have a complexity due to the development of ideational consciousness. Sentiment and desire, in the strict sense of the word, arise at about the same level of psychical development. We might say that a cat has a malevolent sentiment, because it shows signs of anger whenever it sees the child who is in the habit of teasing it; yet it would be the extreme case. (G.F.S., J.M.B.)

The sentiments usually distinguished as notable and representing important movements in mental history are the AESTHETIC (q.v.; cf. BEAUTY, ART, and SYMPATHY, aesthetic—under which the recent theory, which, under the term Einfühlung, requires the revival of affective states as such, is noticed); the Religious (see the various topics RELIGION, especially psychology of), the Ethical (see ETHICS, ETHICAL THEORIES, and the various topics MORAL). A less exactly defined sphere of sentiment is the social, in which we have a sentiment or disposition for social intercourse in general (see especially SOCIAL PSYCHOLOGY, SOCIAL ORGANIZATION, SOLIDARITY, and SOCIUS).

The adjective 'sentimental,'—and especially the verbal noun 'sentimentality'—carries the slightly derogatory meaning of over-emphasis upon sentiment or over-susceptibility to it. (J.M.B.)

Sentiment (aesthetic): Ger. *ästhetisches Gefühl*; Fr. *sentiment esthétique*; Ital. *sentimento estetico*. (1) SENTIMENT (q.v.) directed towards what is aesthetic. Cf. AESTHETIC (with topics cited there), BEAUTY, and SYMPATHY (aesthetic). (J.M.B.)

(2) Occasionally used in an objective sense closely equivalent to 'aesthetic expression,' as in 'the grace and sentiment of French architecture.'

Literature: RIBOT, Psychol. of the Emotions (1897); LADD, Psychol., Descrip. and Explan. (1894), and other textbooks of psychology. See also the citations under AESTHETICS. (J.B.A.)

Sentimental (and **-ity**): see SENTIMENT, ad fin.

Sentimental (in aesthetics): see NAÏVE.

Separation (in biology): see ISOLATION.

Septuagint [Lat. *septuaginta*, seventy]: Ger. *Septuaginta*; Fr. *version des Septante*; Ital. *versione dei Settanta*. A Greek version of the Hebrew Scriptures, in the Alexandrian dialect, said to have been produced at different times and by different translators during the 3rd century B.C., and embracing in order the Pentateuch, the Prophets, and the Hagiographa.

The Septuagint derives its name from the tradition, now discredited, that it was the work of seventy scholars working under the direction of Ptolemy Philadelphus, king of Egypt. It contains not only the Scriptures of the accepted canon, but a number of Apocryphal books. It is the source of the quotations in the New Testament, and had an important influence on the diction of the latter. It was the chief authoritative version of the early church till the appearance of the Latin Vulgate of St. Jerome.

Literature: HORN, Introd. (London, 1877); A. GEIGER, Urschrift u. Übersetzungen d. Bibel (Breslau, 1857); SCHIERER, Jewish People in the Time of Jesus Christ (Eng. trans.), ii. 159–68. (A.T.O.)

Sequence: see CONSEQUENCE.

Serf and **Serfdom**: see SERVITUDE.

Serial Resemblance: see RESEMBLANCE (table, III).

Series [Lat. *series*, succession]: Ger. *Serie*; Fr. *série*; Ital. *serie*. A group of objects linearly related. (C.S.P.)

Used in psychology for a succession of associated or successive elements of content; cf. HANDWRITING, and MOVEMENT, for instances. (J.M.B.)

Services [Lat. *servitium*, also Med. Lat.

servicium]: Ger. (*Dienst-*)*Leistungen*; Fr. *services économiques*; Ital. *servigi*. Means of enjoyment when the processes of production and consumption are indistinguishable in time.

There has been a long and rather profitless discussion of the question whether services should be included in wealth. The answer, indicated by the analyses of Newcomb and Fisher, is that in measurements of wealth as a flow services should be included; but that in measurements of wealth as a fund, they should not be included. (A.T.H.)

Servitude [Lat. *servitudo*, slavery]: Ger. *Sklaverei*; Fr. *servitude*; Ital. *schiavitù*. The state of a slave; the state in which a human being is an object of property, a chattel.

Slavery is one of the oldest and most widely diffused of social phenomena. There may have been a period antecedent to the rise of slavery in which the enemy or stranger (once almost similar characters) was invariably killed and perhaps eaten. But when this first stage of savage life had been surmounted, slavery seems to have been universally recognized. At first the recognition of mutual rights and duties was confined to the small group of persons united by some real or fictitious kinship. As the primitive community enlarged itself, the moral sphere was enlarged also. Men acknowledged the claims of members of the same tribe or city, and even of the same nation, but very faintly recognized those of other aliens. Even Christians, until comparatively recent times, scarcely recognized any duty towards Moslems or heathens beyond that of converting them when possible. Thus until the 18th century most civilized men considered that a great part of the human race might lawfully be held in slavery and treated as articles of property. Aristotle defended slavery under certain circumstances, and the Christian Church did not condemn it.

In the most logical form of slavery the slave is simply an object of property, and as such may be used or destroyed at the pleasure of his owner. Such was the position of the slave in the primitive Roman law. But as such a relation between human beings is repugnant to the better feelings of civilized people, religion and morals tended to mitigate the position of the slave. In Greece and Rome the slave was regarded as a member of the family, and might by emancipation acquire civil and even political rights. The Athenian law and the later Roman law protected him from extreme brutality on the part of his master, but without recognizing him as a legal person or empowering him to defend his own cause. In Greek and Roman society many slaves were highly educated, and were employed in what we should term the liberal professions. Thus they were often the equals of their masters, and the relations between master and slave were often friendly and confidential. But slaves employed in agriculture on large estates were frequently victims of atrocious cruelty. Such slaves took the chief part in the servile wars which mark the last age of the Roman republic. Under the emperors rural slavery was very generally transformed into serfdom. Without ceasing to be a slave, the cultivator acquired a holding and a separate abode. Although still legally at the discretion of his master, he had a freer and more human life than a plantation slave working in a gang and shut up at night in a prison. When the empire became Christian, the slave's family ties, which the law had ignored, were recognized by religion. Serfdom survived the fall of the Roman empire. In Western Europe the bulk of the cultivators were serfs until the 13th century, when various causes produced a rapid diminution of serfdom. In Central Europe serfdom was common down to the French Revolution. In Russia it was only abolished by the Czar Alexander II in the year 1861. The distinguishing characteristic of serfdom as opposed to slavery is found in the customary rights of the serf. Although the serf and his tenement were regarded both by Roman and mediaeval lawyers as the property of the lord, he gradually acquired a customary right not to be disturbed in his holding so long as he rendered the customary payments and services. Thus the serf became a proprietor, although of a degraded kind. Mediaeval and modern law recognized his family relations, regarded him as responsible for crimes, and in relation to all men except his master treated him as virtually a free man. Thus the condition of the serf admitted of a certain degree of wellbeing.

Slavery, in the strict sense of the term, was common in the Roman empire down to its fall, and mediaeval and modern Christians felt no scruple about enslaving persons who were not Christian. In the interminable wars between Christians and Moslems the captives were frequently reduced to slavery, sometimes of the most cruel kind, such as slavery in the galleys. The discovery of the New World gave a powerful impulse to the use of slave labour in working mines and plantations.

All the colonizing peoples and their colonists have been equally guilty in this respect. All the brutalities of ancient slavery have been equalled in the history of the New World. The philanthropic movement of the 18th century led to the suppression first of the slave trade and then of slavery. Both were abolished in the French dominions at the time of the Revolution, although slavery was restored in the French colonies for a short time. In the British dominions the slave trade was abolished in 1807 and slavery in 1833. In the United States slavery was abolished in consequence of the Civil War of 1861–5. Slavery is no longer legal in the territory of any Christian state, although it constantly tends to reappear whenever a barbarous country is entered by white adventurers. Oriental slavery, not yet wholly suppressed in Mohammedan countries, has many peculiar features and a history of its own.

Literature: the classical literature of Greece and Rome abounds in passages illustrative of the position of slaves. Many are collected in the article 'Servus' in Smith's Dict. of Greek and Roman Antiquities. The legal position of the Roman slave is set forth in the Institutes of GAIUS and JUSTINIAN, and the effect of slavery upon Roman society and politics has been strongly depicted by MOMMSEN in his Hist. of Rome. Concerning mediaeval serfdom much will be found in FUSTEL DE COULANGES' great work Les Origines des Inst. de l'ancienne France; in VINOGRADOFF'S Villenage in England; in POLLOCK and MAITLAND'S Hist. of English Law; and in economic histories of the mediaeval period. The standard histories of the Spanish and English colonies in the New World, and books of travel in America in the 17th and 18th centuries, contain many facts about modern slavery. The Abolitionist movement in England and America produced a bulky literature of books, pamphlets, and official and parliamentary papers relating to slavery.

(F.C.M.)

Servitude (in law): Ger. *Dienstbarkeit*; Fr. *servitude*; Ital. *servitù*. A condition of service imposed upon a corporeal thing, in favour of one not its owner, whereby the thing is made liable to suffer something, or its owner is restrained from doing something.

Slavery in this sense is not a servitude; but if the owner of a slave grants a usufruct in him to another, such usufruct is a servitude. *Positive servitude*: one which involves a suffering something to be done. *Negative servitude*: one which involves not doing something, which an owner otherwise could do. *Personal servitude*: one belonging to a certain person, without reference to his ownership of other property. *Praedial* or *real servitude*: one affecting a corporeal thing, and belonging to the owner of other property, as such owner.

This is a copious title in Roman law (see *Dig.*, viii. 1, *de Servitutibus*). The popular meaning of servitude as a *status* of personal subjection also often attaches to the term as used in law, e. g. in the Thirteenth Amendment to the Constitution of the United States.

Literature: MARKBY, Elements of Law, chap. x; HOLLAND, Jurisprudence, chap. xi. 188; Smith's Dict. of Greek and Roman Antiq., 'Servitude'; French Code Civil, Liv. II. tit. 3 and 4. (S.E.B.)

Sex [Lat. *sexus*, from *secare*, to cut]: Ger. *Geschlecht*; Fr. *sexe*; Ital. *sesso*. The condition or quality of producing germ cells of one kind, either male or female. (C.S.M.)

Those organisms which produce ova (called oospheres in plants) are said to be of the female sex; those which produce spermatozoa (spermatozoids in plants), of the male sex; those which produce both ova and spermatozoa are HERMAPHRODITE (q. v.). In sexual reproduction the spermatozoon enters and fuses with the ovum (see FERTILIZATION); the spermatozoon is the active element in this process, the ovum being relatively passive or quiescent, and providing nutriment for the development of the resulting embryo. The characters of the reproductive cells themselves, and of the male and female organisms which bear them, are correlated with this division of labour between the two sexes. In the lower organisms such a differentiation may be little or not at all expressed; as for instance in the Protozoa and lower Algae, where the two cells which fuse in the fertilizing process may be quite similar. Whilst Butschli and Minot believe that the primary function of the sexual fusion is the 'rejuvenescence' of the reproductive cell, Weismann holds that the essential purpose of the process is the mingling of hereditary tendencies derived from each parent. Maupas' observations on Protozoa support the theory of 'rejuvenescence.' See AMPHIMIXIS, OVUM, and SPERMATOZOON. For bodily and mental sexual differences see SEXUAL CHARACTERS.

Literature: Y. DELAGE, Structure du Protoplasma et Biol. Gén. (1895); E. B. WILSON, The Cell (1896, 2nd ed. 1900); O. HERTWIG, Die Zelle (1893); A. WEISMANN, Amphimixis, &c., trans. in Essays upon Heredity (1892);

M. MAUPAS, Recherches expérimentales sur la Reproduction des Infusoires, Arch. Zool. Expér., v. 6 (1888); GEDDES and THOMPSON, The Evolution of Sex (1889). (E.S.G.)

Sexes (psychology of): see SEXUAL CHARACTERS.

Sextus Empiricus. Lived about the latter half of the second century in Greece. He revived the scepticism of Pyrrho.

Sexual Characters: Ger. *Geschlechtscharaktere*; Fr. *caractères sexuels* (*primaires et secondaires*); Ital. *caratteri sessuali*. The physical and mental peculiarities which differentiate the sexes. (J.M.B.)

The physiological interest in sexual characteristics arises from the unlimited mental and emotional concomitants which differentiate the sexes. In the strictest sense, the organs concerned in reproduction, and their functional characteristics, constitute the 'primary' sexual characters; with these may be included—or assigned a special position—the organs of gestation and lactation in woman. All further differences of function and structure constitute 'secondary' sexual characters (a term first used by Hunter, 1728–93); while differences which are still further removed, and which are apparently derived or incidental concomitants of specifically secondary sexual characters, may properly be termed tertiary sexual characters (Ellis). The beard and the distribution of the hair, differences of larynx and voice, the rounding of outline due to the deposit of adipose tissue in the female, the larger muscular system and skeleton of the male, are examples of secondary sexual characters. The greater precocity of the girl, the greater emotional affectability of woman, the love of adornment, the greater dependence upon unanalysed impulses, in contrast to conscious logical motives, may be cited as instances of tertiary sexual characters.

The origin of secondary and tertiary sexual characters cannot be determined in all cases; many of them are such as were developed, or may readily be conceived to have been developed, by sexual selection, and result in making the sexes more attractive to each other; the woman more womanly, the man more manly. The personal, social, and industrial division of duties, both in primitive and in more developed forms of life, doubtless emphasized incipient masculine and feminine tendencies and introduced additional ones. Upon this basis are grafted the results of conventional differences of training, of social environment, and of racial and national ideals; so that it is frequently difficult to determine how far tertiary sexual characters represent differences of original nature or of acquired nurture. Such differences are frequently determinable only on the basis of complex statistical data difficult to secure and to interpret.

Certain prominent or interesting differences may be enumerated as follows: the male is larger, his muscles and bony prominences are more defined; the female has a relatively long trunk and short limbs; in body-growth there is a period during puberty ($12\frac{1}{2}$–$14\frac{1}{2}$ in Great Britain) when girls are taller and heavier than boys; the boy's year of most active growth is the sixteenth, the girl's the thirteenth or fourteenth; the woman reaches maturity at twenty years, the man, not until somewhat later; the greater brain-weight and cranial capacity of man, while obvious, are difficult to determine in independence of body-weight and size; the female pelvis presents distinctive features not found in the male; that the female body in many respects is more like that of the child (infantilism), and that it presents a lesser degree of variability (i. e. it presents greater organic conservatism), seems well established; woman shows a greater immunity from gross lesions of the nervous system than man; woman presents a greater power of resistance to disease and death, and thus has a greater longevity; the red corpuscles of the blood are more numerous in the male; his lung capacity is greater, but the costal breathing of woman, as opposed to the abdominal breathing of man, is generally regarded as an artificial effect of constricting dress. In pathological respects masculine and feminine susceptibility are measurably different; general paralysis is a typical nervous disorder of men, hysteria of women; differences in sense-endowment are difficult to substantiate, the marked prevalence of colour-blindness in men constituting an exception; the emotional susceptibility and variability of woman are greater, and appear in abnormal (mania, melancholia, violent outbursts, &c.) as well as in normal manifestations; the more sympathetic, less egoistical nature of woman and greater craving for regard as well as greater patience and sacrifice in devotion may also be noted; differences of intellectual endowment and tendencies doubtless exist, but are not readily summarized, and form part of the group in which it is particularly difficult to allow for the effects of education and convention. While such an eclectic summary does not convey an exact notion of

the relative importance of sex differentia, it may serve to indicate some of the rubrics which command present investigation. The general principles under which sex differences are viewed are everywhere important, and find a suitable representation in the best discussions. Another phase of the literature, which cannot be further referred to, is concerned with the social and industrial aspect of the occupations of the sexes and their adaptation to the conditions of modern society. The educational aspect of this general problem has for decades been prominent, and forms one of the several practical questions upon which the determination of derived characters has an important bearing.

Literature: HAVELOCK ELLIS, Man and Woman (1895), and Studies in the Psychol. of Sex, i (1898); H. CAMPBELL, Differences in the Nervous Organization of Man and Woman (1891); THOMAS, Metabolism of the Sexes, Amer. J. of Sociol., iii. 31, and 754; ROMANES, Nineteenth Cent. (May, 1887); PLOSS and BARTELS, Das Weib in der Natur- u. Völkerkunde (3rd ed., 1891); MASON, Woman's Share in Primitive Culture (1894); HIGGINSON, Common Sense about Woman (1891); LOMBROSO and FERRERO, La Donna (1891); BALDWIN, art. Woman, in Johnson's Univl. Cyc., suppl. vol. (1899). (J.J.)

Sexual Feeling: Ger. *geschlechtliches Gefühl*; Fr. *sentiment sexuel*; Ital. *sentimento sessuale*. A whole system of emotions and feelings which arise and develop in connection with the organic craving dependent on sexual relations. Cf. SEXUAL SENSATION, and SEXUAL CHARACTERS. (G.F.S.)

Sexual Reproduction: Ger. *geschlechtliche Fortpflanzung*; Fr. *reproduction sexuelle*; Ital. *riproduzione sessuale*. The multiplication of individuals of the same species by means of gonads (fertilized germ-cells, ova, and spermatozoa).

Synonymous with GAMOGENESIS (q. v.). See also FERTILIZATION, and SEX. (C.S.M.)

Sexual Selection: Ger. *sexuelle Auslese* (*Selektion*), *geschlechtliche Zuchtwahl*; Fr. *sélection sexuelle*; Ital. *selezione sessuale*. The more or less conscious selection of one mate by another, and its influence on subsequent evolution. See SELECTION (in biology, *b*), and FACTORS OF EVOLUTION.

Suggested and expounded by Charles Darwin as supplementary to natural selection, it has held its place in the theory of evolution. It is now generally held, however, that Darwin laid too much stress on the conscious preference of the female for the male which she selects over others, as if she compared them before choosing. The theory, as at present held, makes the selection a simple response, largely of organic kind, to the increased sexual stimulation experienced by the female in the presence of the more attractive male. As pointed out by Hirn (as cited below, 201), this is not an essential difference for biology, but it is for the theory which finds the origin of art in this relation of the sexes. It has been argued by Hirn and Groos (and suggested by Guyau) that the native coyness of the female is correlative to the attractiveness of the male, and sexual selection operates largely by the overcoming of this native coyness.

Literature: that of EVOLUTION (q. v.), notably DARWIN, WALLACE, and the general expositions of CONN and HEADLEY. See also GROOS, Play of Animals (Eng. trans.); HIRN, Origins of Art, chap. xiv (reproducing an earlier Swedish work). (J.M.B., E.B.P.)

Sexual Sensation: Ger. *Sexualempfindung*; Fr. *sensation sexuelle*; It. *sensazione sessuale*. The ORGANIC SENSATION (q. v.) of SEX (q. v.). (J.M.B.)

Shaftesbury, Anthony Ashley-Cooper, third Earl of. (1671–1713.) Born in London, and educated under the supervision of Locke. He entered Parliament, 1693; lived in Holland, 1698–9; succeeded to the peerage, 1699; retired from public life upon the death of William III. He was one of the group of 'English moral philosophers'; see ETHICAL THEORIES (1), (*c*).

Shamanism [Pers. and Hindu *Shaman*, idolater]: Ger. *Schamanismus*; Fr. *chamanisme*; Ital. *sciamanismo*. The belief entertained by some North Asiatic and American tribes that the fortunes of life are chiefly determined by a group of inferior deities or spirits, who are for the most part evilly disposed, and whose worship is incantation.

The tribes in question believe in a supreme deity who is good. But they believe also that a class of inferior and malevolent spirits so dominate the lower world that man is largely at their mercy. The religious worship is therefore devised with reference to these evil spirits or devils, and consists in attempts to appease and propitiate them by means of spells and incantations.

Literature: TYLOR, Primitive Culture (1877); GARDNER, Faiths of the World; SOMMIER-STEPHEN, In Siberia. (A.T.O.)

Shame [ME. *shamen*]: Ger. *Scham*; Fr. *honte*, *pudeur* (physical); Ital. *vergogna*.

Lowered self-esteem felt with reference to something positive pertaining to self, and open to the knowledge or opinion of others.

The demarcation of shame off from the forms of shyness (MODESTY, COYNESS, and BASHFULNESS; see these terms) proceeds upon the positive and strong self-abasement which it involves, as contrasted with the hesitation, caution, and inhibition of those states of mind. While they seem to require only the consciousness of exposure to others, and, in the higher states (modesty), reflection upon this relation, shame includes a further sense of self-condemnation or conscious ill-desert. In general, shame arises when modesty and other sentiments of self-respect are violated. On the organic side, it is mainly revealed by the blush, which seems to connect it with bashfulness and coyness, for they also involve vaso-motor changes. The two classes of causes of shame are: (1) exposure in situations involving physical indelicacy, notably in matters concerning those bodily functions which are considered private. It is in this regard that shame approaches coyness, since the privacy of the physical functions centres about the privacy of sex. It is not coyness entirely, however, since the sense of self, involving responsibility and personal disgrace, enters into shame. (2) Exposure in situations of an intellectual and moral sort, in which (*a*) the simple weakness of the person is revealed, as in physical or moral cowardice; in which (*b*) there is disappointment of expectation; or in which (*c*) there is actual breach of social or moral prescription.

Literature: see under SHYNESS; a recent anthropological paper is ELLIS, The Evolution of Modesty, Psychol. Rev. (1899), vi. 134 ff. (J.M.B.)

Shamming: see MAKE-BELIEVE (1).

Shock (in medicine) [AS. *shakan*, to shake]: Ger. *Schock*; Fr. *choc, shock*; Ital. *colpo, 'shock.'* A condition of sudden disturbance, mainly of an inhibitory character, affecting almost all the vital and nervous functions, following upon bodily injury or intense emotion.

The typical symptoms of shock, whether of physical or of mental origin, are in the nature of a profound interference with the functional activities of body and mind. The pulse and respiration are markedly lowered; the body temperature falls, and a cold perspiration ensues; the subject feels faint and sick; may be unconscious or but dimly realize his position; is apt to be anxious and apprehensive, and may be much excited. The psychological interest in this condition arises from the fact that purely or largely emotional causes may produce the same or nearly the same results as actual physical injury. In railway disasters or other conditions of great danger or fright, persons who have escaped without bodily injury often suffer severely from shock; while in surgical operations, in accidents, in battle, the emotional complications are admitted by all to be a most important factor in the resulting disabilities. Even death itself may result from purely emotional causes. Shock with excitement is often termed eristhenic shock. The mode of action of shock is not clearly determined, but its connection with an interference with the normal relations of inhibition, particularly as affecting the circulation, seems to be borne out by clinical and experimental evidence. The dazed condition at times observable in cases of shock has been regarded as akin to the state of hypnosis.

Literature: art. Shock from Fright, in Tuke's Dict. of Psychol. Med.; GROENIGEN, Über den Schock (1885). (J.J.)

Short Cut (in neurology and biology): Ger. *Abkürzung*; Fr. *condensation de l'ontogenèse* (Y.D.); Ital. *abbreviamento ontogenico*. Abbreviation of ontogenetic development by the omission of some of the stages required by the law of RECAPITULATION (q.v.). See also ONTOGENY, and cf. v. BAER'S LAW.

The term is used informally by Foster for the shorter of two alternative brain paths, and made a technical one in the above sense by the present writer.

Literature: FOSTER, Textbook of Physiol. (5th ed.), iii. 1062; BALDWIN, Ment. Devel. in the Child and the Race, chap. i. 74; BOSANQUET, Social Automatism, Mind, N.S., viii. (1899) 167 (who makes a social application). (J.M.B.)

Shyness or **Timidity** [ME. *shey*, timid; Lat. *timidus*, fearful]: Ger. *Schamhaftigkeit, Verschämtheit* (K.G.); Fr. *timidité*; Ital. *timidità*. A state of more or less apprehension and caution in the presence of others, taking on various special forms, with special physical attitudes, according to the circumstances.

It is recommended that these terms denote the general condition and reaction of which BASHFULNESS, COYNESS, and MODESTY are special cases (see those terms). The physical reactions may well be known as shyness-reactions. Between shyness and timidity no distinction is attempted; yet the term shyness

is perhaps preferable, since timidity and timid are used sometimes for 'fear.'

Literature: DARWIN, Expression of the Emotions; MOSSO, Fear; GROOS, The Play of Animals, 243 f., 283 f.; DUGAS, La Timidité; H. CAMPBELL, Brit. Med. J., Sept. 26, 1896; BALDWIN, Ment. Devel. in the Child and the Race, chap. vi. § 5; Social and Eth. Interpret., chap vi; HARTENBERG, Les timides et la timidité (1901). (J.M.B.)

Sibilants: see PHONETICS.

Sibylline Books [Lat. *sibyllinus*, pertaining to a sibyl]: Ger. *die Sibyllinischen Bücher*; Fr. *les livres sibyllins*; Ital. *i libri sibillini*. The books of prophecy which Herophile, the most famous of the ancient sibyls, is said to have sold to Tarquinius Superbus, and which were preserved by the Romans and consulted in urgent matters.

The Sibylline books were lost in the destruction of the temple of Jupiter by fire in 83 B.C. A new collection was made, which has also been lost. The extant twelve books of so-called Sibylline prophecies are of later and mostly spurious origin. (A.T.O.)

Side Window Experiment: Ger. *seitlicher Fensterversuch*; Fr. (not in use—L.M.); Ital. *esperimento della finestra laterale*. An experiment in binocular contrast: standing unsymmetrically with respect to a window, obtain double images of a white surface on a dark ground; the single image appears faintly blue (blue-green) on the window side, and faintly red (orange) on the other side.

Literature: FECHNER, Binoc. Sehen, 511 ff.; SANFORD, Course in Exper. Psychol., expt. 168. (E.B.T.–C.L.F.)

Sidgwick, Henry. (1838–1900.) Born in Yorkshire, England, educated at Rugby School and Trinity College, Cambridge, he became a fellow and lecturer at Trinity College in 1859, reader in moral science in 1875, professor of moral philosophy in Cambridge University, 1883. He was identified with the movement in England for the higher education of women, and especially with the interests of Newnham College for women, at Cambridge. His principal works are in ETHICS (q. v.) and politics, his position in ethics being that of a 'modified' utilitarian. Cf. UTILITARIANISM. He was one of the 'Consulting Editors' of this DICTIONARY. See an 'auto-historical' note in his *Methods of Ethics* (6th ed.); Hayward, *The Ethical Philosophy of Sidgwick* (1901), and L. Stephen, in *Dict. of Nat. Biog.*, Sup. iii, sub verbo.

Sighting Line: Ger. *Visirlinie*; Fr. *ligne de visée*; Ital. *linea di sguardo*. The straight line connecting two luminous points which appear to be in exactly the same direction from the observer.

The sighting lines intersect at the centre of the image of the pupil made by the cornea (which is only 0·6 mm. in front of the true position of the pupil). The principal sighting line is practically identical with the principal ray of direction (line of sight).

Literature: HELMHOLTZ, Physiol. Optik (2nd ed.), 115, 127, 617, 672; SANFORD, Course in Exper. Psychol., 187; WUNDT, Physiol. Psychol. (4th ed.), ii. 106. (E.B.T.)

Sign [Lat. *signum*, a mark, a token]: Ger. *Zeichen*; Fr. *signe*; Ital. *segno*. (1) Anything which determines something else (its *interpretant*) to refer to an object to which itself refers (its *object*) in the same way, the interpretant becoming in turn a sign, and so on *ad infinitum*.

No doubt, intelligent consciousness must enter into the series. If the series of successive interpretants comes to an end, the sign is thereby rendered imperfect, at least. If, an interpretant idea having been determined in an individual consciousness, it determines no outward sign, but that consciousness becomes annihilated, or otherwise loses all memory or other significant effect of the sign, it becomes absolutely undiscoverable that there ever was such an idea in that consciousness; and in that case it is difficult to see how it could have any meaning to say that that consciousness ever had that idea, since the saying so would be an interpretant of that idea.

A sign is either an *icon*, an *index*, or a *symbol*. An *icon* is a sign which would possess the character which renders it significant, even though its object had no existence; such as a lead-pencil streak as representing a geometrical line. An *index* is a sign which would, at once, lose the character which makes it a sign if its object were removed, but would not lose that character if there were no interpretant. Such, for instance, is a piece of mould with a bullet-hole in it as sign of a shot; for without the shot there would have been no hole; but there is a hole there, whether anybody has the sense to attribute it to a shot or not. A *symbol* is a sign which would lose the character which renders it a sign if there were no interpretant. Such is any utterance of speech which signifies what it does only by virtue of its being understood to have that signification.

(2) Used for COEFFICIENT (q. v.) or MARK

(q. v.). Cf. LOCAL SIGN, and TEMPORAL SIGN. (C.S.P.)

This division of signs, suggested by C.S.P., may be compared with the more generally recognized classification given under SIGN-MAKING FUNCTION; they serve different purposes, and do not seem to be inconsistent. (J.M.B.)

Sign (and **Signature**, in psychology). (1) See SIGN (1), and cf. LOCAL SIGN, TEMPORAL SIGN, SYMBOL, and SYMPTOM.

(2) Used also for the various symbols—written, spoken, &c.—of the LANGUAGE FUNCTION (q. v.), such as vocal sign, gesture sign, graphic sign, &c. (J.M.B.)

Sign (logical). Any symbol employed in logical writing. Cf. LOGICAL DIAGRAM, SYMBOL, and see the signs employed in the longer logical articles, e. g. LOGIC, LOGIC (exact), TERM, and SYMBOLIC LOGIC.

In regard to the use of signs for logical aggregation and multiplication, it is recommended that the traditional symbols be adhered to as follows:

(1) For aggregation, the plus sign +: something which is either *a* or *b*.

(2) For multiplication, the form *ab*: something which is at once *a* and *b*. (C.L.F., J.M.B.)

Signal (of Deprez): see LABORATORY AND APPARATUS, II (general).

Significance: see SIGNIFICS (1, *c*).

Signification (and **Application**, in logic): Ger. *Bedeutung*; Fr. *signification*; Ital. *significato*. See CONNOTATION (2), and DENOTATION, and cf. MEANING, SIGNIFICS, and SEMANTICS.

These are substitute terms for what are called by Mill and others connotation and denotation; for (1) the previously well-established use of connote was somewhat warped by Mill and his followers, and (2) these words may be applied to the corresponding properties of propositions as well as terms. The application of a term is the collection of objects which it refers to; of a proposition it is the instances of its holding good. The 'signification' of a term is all the qualities which are indicated by it; of a proposition it is all its different implications.

Great confusion has arisen in logic from failing to distinguish between the different sorts of signification, or connotation, of a term: thus to the question, Are proper names connotative? 'contradictory answers are given by ordinarily clear thinkers as being obviously correct,' for the reason that they have not the same thing in mind under the term connotation. It is necessary to distinguish between (1) the indispensable signification; (2) the banal signification; (3) the informational signification; and (4) the complete signification. (1) is so much as is contained in whatever may be fixed upon as the definition of the term—all those elements of the meaning in the absence of any one of which the name would not be applied; (2) is what 'goes without saying,' what is known to every one, and (3) is what there is occasion to give utterance to: these of course vary with the different individuals to whom the proposition is given out—that oxygen is exhilarating is informational to the student of chemistry, and banal to the teacher of chemistry (but false to those who are familiar with the latest results of the science); (4) consists of all the valid predicates of the term in question. When I say, 'The one I saw yesterday was John Peter,' the indispensable signification of John Peter is simply an individual object of consciousness (usually a man, though it may be a dog, or a doll) whom it has been agreed to designate by that name; but the banal signification, to one who knows John Peter well, is very extensive.

The same characteristics apply to propositions as well as to terms: thus the complete signification (or implication) of *All x is y* is all its valid consequences, and its complete application (or range) is all those descriptions of circumstances under which it holds good—that is to say, all its sufficient antecedents. (C.L.F., C.S.P.)

A general term denotes whatever there may be which possesses the characters which it signifies; J. S. Mill uses, in place of signifies, the term connotes, a word which he or his father picked up in Ockham. But signify has been in uninterrupted use in this sense since the 12th century, when John of Salisbury spoke of 'quod fere in omnium ore celebre est, aliud scilicet esse appellativa *significant*, et aliud esse quod *nominant*. Nominantur singularia; sed universalia significantur.' Nothing can be clearer. There is no known occurrence of connote as early as this. Alexander of Hales (*Summa Theol.*, I. liii) makes *nomen connotans* the equivalent of *appellatio relativa*, and takes the relation itself as the accusative object of *connotare*, speaking of 'creator' as *connoting* the relation of creator to creature. So Aquinas, *In sentent.*, I. dist. viii. q. 1, Art. 1. Subsequently, because adjectives were looked upon as relative terms, *white* being defined as 'having whiteness,' &c., the adjective was

looked upon as connoting the abstraction, but never unless its supposed relative character was under consideration. Tataretus, for example, who wrote when the usage was fully established, will be found using such phraseology as the following: 'Nulla relativa secundum se habent contrarium, cum non sint qualitates primae, sed solum relativa secundum dici, et hoc secundum esse absolutum et significatum principale eorum et non secundum esse respectivum et connotativum.' Chauvin (1st ed.) says: 'Connotativum illud est cuius significatum non sistit in se, sed necessario ad aliud refertur, vel aliud connotat. V.g. *Rex, magister, primus.*'

It unfortunately happened, as the above quotations show, that the precise meaning recognized as proper to the word 'signify' at the time of John of Salisbury (a younger contemporary of Abelard) was never strictly observed, either before or since; and, on the contrary, the meaning tended to slip towards that of 'denote.' Yet even now the propriety of John's remark must be recognized.

A number of works were written in the middle ages *De modis significandi*, based upon Priscian (a contemporary of Boethius), who in turn followed Apollonius the bad-tempered, 'grammaticorum princeps,' who lived in the time of Hadrian and Antoninus Pius. Cf. also Thurot, *Notices et Extraits des MSS.*, xxii. Pt. II, and Duns Scotus, *Works*, Lyons ed., I. (C.S.P.)

Significs: Ger. *Bedeutungslehre*; Fr. *théorie des significations*; Ital. *teoria delle significazioni* (the foreign equivalents are suggested). (1) Significs implies a careful distinction between (*a*) sense or SIGNIFICATION (q. v.), (*b*) meaning or INTENTION (q. v.), and (*c*) significance or ideal WORTH (q. v.). It will be seen that the reference of the first is mainly verbal (or rather SENSAL, q. v.), of the second volitional, and of the third moral (e. g. we speak of some event 'the significance of which cannot be overrated'; it would be impossible in such a case to substitute the 'sense' or the 'meaning' of such event, without serious loss). Significs treats of the relation of the sign in the widest sense to each of these.

(2) A proposed method of mental training, aiming at the concentration of intellectual activities on that which is implicitly assumed to constitute the primary and ultimate value of every form of study: i. e. what is at present indifferently called its meaning or sense, its import or significance.

Significs affords also a means of calling attention to the backwardness of language in comparison with other modes of human communication, and to the urgent need of stimulating thought by the creation of a general interest in the logical and practical as well as the aesthetical value of all forms of expression. And it provides a convenient general term under which to work perhaps for an international consensus, and for a natural check upon wilful waste or misuse of the existing resources of language, by bringing to bear upon it a certain deterrent of social and academic 'constraint' (cf. the Editor's Preface, viii).

Significs make practically for the detection of lurking confusion or specious assertion in directions where the discipline of formal logic would help less directly and simply. But it is suggested that this study, so far from superseding or displacing or even distracting attention from the disciplines already recognized, would rather render them more effectual because more vitally significant: more obviously related to ordinary experience and interests. It would also bring out the moral value of a greater respect for the traditions and the future of language, and would in fact, while preparing the ground for an expansion of the limits of articulate expression, tend to create a linguistic conscience which must beneficially react upon thought, thus bringing about gradually and naturally a spontaneous consensus in definition.

Much work is already being done in this direction. Significs as a science would centralize and co-ordinate, interpret, interrelate, and concentrate the efforts to bring out meanings in every form, and in so doing to classify the various applications of the signifying property clearly and distinctly.

Literature: A. SIDGWICK, Distinction and Criticism of Beliefs; KARL PEARSON, Grammar of Science; MAHAFFY, Modern Babel, in Nineteenth Cent., November, 1896; EUCKEN, Gesch. d. philos. Terminologie (1879); and Monist, July, 1896; BRÉAL, Essai de Sémantique; JESPERSEN, Progress in Language; F. TÖNNIES, Welby Prize Essay, Mind, January and April, 1899; BACON, HOBBES, and later WHATELEY, G. CORNEWALL LEWIS, and J. S. MILL are among those who have discussed the general subject. See also E. MARTINAK, Psychol. Untersuch. z. Bedeutungslehre (1901). (V.W., G.F.S., J.M.B.)

Sign-making Function: (not in use in the other languages). The selection or construction of certain objects—the signs—in order that by mentally operating with these,

results may be obtained applying to other objects—the things signified. It is also called (McCosh) the symbolic function.

The possibility of this procedure depends upon the existence of an appropriate connection between the signs and what they signify. But the nature of the connection may vary so as to constitute different kinds of signs. We may distinguish (1) the demonstrative sign, (2) the discriminative sign, (3) the mnemonic sign, (4) the expressive sign, (5) the substitute or symbolic sign. Cf. SIGN.

(1) The demonstrative sign is the simplest and most primitive. It is used by animals as well as by men. It consists in some act by which one individual, who is interested in an object present to the senses, draws the attention of another individual to that object. The second individual attends primarily to the action of the first, and is thus indirectly led to attend to something else. Pointing with the finger is a typical illustration.

(2) The discriminative sign consists in some modification of an object or addition to it, made with the view of enabling us to identify and distinguish it in the future. Thus the robber who made a chalk-mark on Ali Baba's door used a discriminative sign. The house he desired to identify in the future was so like others in the neighbourhood that he feared it would be indistinguishable. But he was convinced that he could always distinguish a door with a chalk-mark on it from a door with no chalk-mark. He accordingly made a chalk-mark on Ali Baba's door. Morgiana destroyed its discriminative value by making similar marks on the neighbouring doors.

(3) The mnemonic sign is simply an aid to memory. *A* is so connected with *B* that when we think of *A* we shall probably or certainly think of *B*. Now, if *B* is something which we are in danger of forgetting, and if we attempt to obviate this risk by arranging so that the recall of *A* shall be practically certain at the proper moment, and thus call up the idea of *B* when we want it, we are using *A* as a mnemonic sign. Some people, for instance, tie a string round one of the fingers to prevent their forgetting something which they have to do. The assumption is that they will frequently notice the string round the finger, and be thereby reminded of the business which they wish to remember. The device may fail, either because they are oblivious of the string at the critical time, or because, when they do notice it, it fails to yield the required reminder

(4) The expressive sign is not merely, like the mnemonic, a means of calling up the idea of an object. It is a means of attending to the object while it is present to consciousness. When the mnemonic sign has reminded us of that which it signifies, it has no longer any function to discharge, and may be dismissed. But words and the gestures composing the language of natural signs are constituent factors of the very act of thinking of the objects which they signify. They are means of thinking of the object, as the handle of a box is a means of lifting it; and just as some things cannot be lifted without a handle, so some objects—concepts—cannot be thought of without words, or other expressive signs. See LANGUAGE FUNCTION, and cf. SPEECH.

(5) The substitute or symbolic sign is antithetically opposed in its nature to the expressive sign. The expressive sign is a means of attending to the object signified; the substitute sign is a means of dispensing with attention to the object signified. Thus in cribbage the relative position of the pegs in the cribbage board is substituted for the relative number of points won by the players. In solving a problem by algebraical methods, when we have once assigned suitable symbols to the several quantities, we need not in the actual process think of anything but these symbols, and the rules of operation applying to them. The equation might be solved by some one who did not know what problem it represented. It is only when the solution of the equation is obtained that the need arises to retranslate our symbols in terms of that which they signify. Working with logarithms is another example. (G.F.S.)

Sigwart, Heinrich Christoph Wilhelm. (1789–1844.) Born and brought up at Remmingsheim in Würtemberg, he became Privatdocent in philosophy at Tübingen in 1813; professor extraordinary in 1816; and ordinary in 1818. He died at Stuttgart.

Similar (with **Similarity, Similitude**) [Lat. *similis*, like]: Ger. *ähnlich, gleichartig*; Fr. *semblable*; Ital. *similare*. See RESEMBLANCE.

Similar (in exact logic): having a common predicate of some considerable logical depth.

Similar whole: a whole of similar parts.

Term of similitude: a general name. (C.S.P.)

Similarity (consciousness of, law of): see LIKENESS (consciousness of, and law of), and RESEMBLANCE.

Similia similibus percipiuntur [Lat.]: see PERCEPTION, ad fin.

Simple [Lat. *simplex*, from *sim*, same, one, + *plicare*, to fold]: Ger. *einfach*; Fr. *simple*; Ital. *semplice*. Original or first in its nature; elementary; without parts or complication: opposed to COMPLEX (q. v.), COMPOUND (q. v.), and derived. (C.S.P.–J.M.B.)

Simple acceptation: the acceptation of a term to signify a nature abstracted from existence, as 'animal is the genus of man' (*Century Dict.*). (C.S.P.)

Simple agreement: the agreement of one thing with another; opposed to analogy or the agreement of many things with many. *Simple agreement* is either *essential* (which is identity in the sense of unity of essence) or *accidental*. Accidental simple agreement is either internal or external; the former being either equality or likeness, the latter correlationship to thirds which agree.

Simple apprehension: (1) the faculty or act of apprehending without forming judgments. See APPREHENSION (2). (2) INTUITION (q. v., in philosophy).

Simple COMPARISON (q. v.): the faculty or act by which the subject and predicate of a judgment are compared (cf. *Century Dict.*). (C.S.P.–J.M.B.)

Simple concept: a concept of which no other definite concept (at any rate, no first-intentional concept) can be predicated.

Simple consequence: (1) an inference drawn from a single premise. This was the standard form of setting forth arguments in the scholastic writings of the middle ages. The suppressed major premise was called the *consequentia*. (2) An inference drawn from a single premise, from which the conclusion follows by virtue of the meaning of the middle term.

Simple CONVERSION (q. v.): the immediate inference from a proposition to another proposition differing from the former only by the interchange of subject-term and predicate-term.

Simple enumeration: a term of Francis Bacon's, by which he means mentioning a number of instances of *a*'s which are *b*'s, and thence concluding that every single *a* is a *b*, of which he well says: 'Inductio quae procedit per enumerationem simplicem res puerilis est, et precario concludit, et periculo exponitur ab instantia contradictoria, et plerumque secundum pauciora quam par est, et ex his tantummodo quae praesto sunt, pronunciat.' It is not in truth induction, but a singularly futile sort of presumption.

Simple enunciation: a proposition which is not resolvable into copulative or disjunctive parts. Thus, 'All men are all rational animals' is resolvable into 'Every man is a rational animal, and every rational animal is a man.' So 'Every man is a rational animal' is resolvable into 'Every man is rational, and every man is an animal.' But though perhaps every proposition of the form 'Every *S* is *P*' is composite, yet the form itself may be regarded as simple.

Simple interpretation. In this phrase, interpretation means the subject of Aristotle's *Peri hermeneias*, that is to say, a SYMBOL (q. v.). A simple interpretation is one which does not have (either expressed in words or in circumstances) one part to show what it denotes and another to show what it signifies; that is to say, it is a term or *rhema* (PREDICATE, q. v., 2).

Simple MODE (q. v., ad fin.): a term of Locke's (*Essay*, II. xii. 5); a variation of one simple idea.

Simple necessity: the necessity of that whose contradictory involves contradiction (Scotus, *Opus Oxon.*, IV. xii. 7).

Simple part: a part which has no parts in the sense in which it is itself a part.

Simple power: the same as pure power, or that passive power which belongs to 'first' MATTER (q. v., Aristotle's use).

Simple probation: a proof consisting of a single syllogism.

Simple proposition: *simple enunciation* (q. v. above). Yet all categorical propositions are sometimes so called.

Simple question: a question which asks either *whether* or *what* anything is, as contradistinguished from a complex question which asks of a thing whether or why it has a certain character.

Simple supposition: *simple acceptation* (q. v. above). Petrus Hispanus says: 'Accidentalium suppositionum alia simplex; alia personalis. Suppositio accidentalis simplex est acceptio termini communis pro re universali significata per ipsum terminum: ut cum dicitur, homo est species, animal est genus.' Ockham (*Logica*, I. lxiv) says: 'Est autem primo sciendum quod suppositio primo dividitur in suppositionem simplicem, personalem, et materialem. . . . Suppositio simplex est quando terminus supponit pro intentione animae sed non tenetur significative. Verbi gratia, dicendo sic, homo est species, ille terminus homo supponit pro intentione animae, quia illa intentio est species,

et tamen proprie loquendo ille terminus homo non significat illam intentionem; sed illa vox et illa intentio animae sunt tantum signa subordinata in significando.'

Simple syllogism: a SYLLOGISM (q. v.) which cannot be resolved into several syllogisms, nor contains any composite propositions.

Simple truth: that truth which pertains to the thing itself; otherwise called 'transcendental truth.' (C.S.P.)

Simplicity (in aesthetics) [Lat. *simplex*, from *sine* + *plico*, without fold]: Ger. *Einfachheit*; Fr. *simplicité*; Ital. *semplicità*. As aesthetic quality, the restriction of the number and variety of parts in an aesthetic whole, in the interest of unity and of ease of comprehension.

It excludes not only what is superfluous or exaggerated, but even elements that might have value by adding to the richness of the unity. It represents one pole (becoming in extreme form bareness or meagreness) of aesthetically pleasing form, as variety represents the other.

Literature: KÖSTLIN, Aesthetik, 94 f.; see also UNITY IN VARIETY. (J.H.T.)

Simplicius. Lived in the first half of the 6th century A.D. Taught by Ammonius Saccus. He himself taught at Athens, and in 529 A.D., following the edict of Justinian closing the schools of philosophy at Athens, emigrated into Persia, but returned disappointed. A Neo-Platonic thinker, and commentator on Aristotle's works.

Simulation [Lat. *simulatio*, a feigning]: Ger. *Simulation*; Fr. *simulation*; Ital. *simulazione*. (1) MAKE-BELIEVE (q. v.); see also SEMBLANCE.

(2) Conscious perception, including EQUIVOCATION (q. v.) and LIE (q. v.).

(3) In medicine: the feigning or counterfeiting of the symptoms of a disease; also called malingering.

Mental symptoms, as well as such sensory defects as colour-blindness and deafness, seem especially liable to simulation, and are often counterfeited with the object of escape from military duty, or the consequences of a crime, or again for no very obvious intent (see below). Simulation is generally detected by the overacting of the symptoms, the absence of slight accessory characteristics, and the results of special tests. Of the various insanities, mania, melancholia, and delusional insanity (paranoia) are perhaps the most susceptible to simulation, but the number of cases of successful simulation is probably extremely small. It should be noted, however, that in many cases a true abnormal condition is present (of which, indeed, the tendency to simulate or assume the symptoms is an expression), although not the specific disease which is simulated. Cases of moral insanity, and many of the borderland cases of mental abnormality, often exhibit a tendency to assume mental disorders which are not real. In hysteria this quasi-simulation is of an allied type. Hysterical symptoms are in a literal sense real and not simulated. But, on the one hand, while they are subject to a variety of psychical influences, and thus may be said to present a form of simulation *sui generis* (see HYSTERIA), on the other hand, medical writers note that many of the symptoms exhibited in hysteria are often produced by other and true organic disturbances.

Literature: art. Simulation of Hysteria, in Tuke's Dict. of Psychol. Med.; TOMELLINI, Delle Malattie simulate (1877). (J.J.)

Sin (in ethics and theology) [AS. *syn*, mischief, harm]: Ger. *Sünde*; Fr. *péché*; Ital. *peccato*. Conscious nonconformity to or transgression of an ideal standard of right or duty as revealed in conscience or the divine law, together with the tendency or disposition to such nonconformity or transgression.

Sin is to be distinguished from crime, which is a breach of civil law, and vice, which is a breach of a social requirement, the standards of which are relative. Sin can arise only in view of an ideal requirement. Therefore only God can forgive sin. In Christian theology there are the two profoundly different views of sin and its relation to the nature of man, represented by AUGUSTINIANISM (q. v.) and PELAGIANISM (q. v.); the one finding sin deeply rooted in man's nature and rendering him helpless for good, and therefore a subject of sovereign grace, the other treating it as a disturbance which does not profoundly affect man's nature or his ability to do good.

Literature: besides the works of AUGUSTINE and the Pelagians, see JULIUS MÜLLER, Die christl. Lehre v. d. Sünde (Eng. trans.); JONATHAN EDWARDS, The Great Doctrine of Original Sin defended; A. BROWN, The Doctrine of Sin (1881). (A.T.O.)

Sincerity [Lat. *sincerus*, from *sine*, without, + *cera*, wax]: Ger. *Aufrichtigkeit*; Fr. *sincérité*; Ital. *sincerità*. Disposition not to mislead others either positively or negatively.

Sincerity is thus wider than veracity. The sincere man aims to be truthfully understood,

whether he make positive representations or not. Honesty is often used for sincerity in this sense. Cf. VERACITY, and LIE. (J.M.B.)

Sine qua non [Lat.]. Abbreviation of *conditio sine qua non*: necessary condition. See NECESSARY AND SUFFICIENT CONDITION. (J.M.B.)

Single: see INDIVIDUAL (different topics).

Singular [Lat. *singulus*, separate; translates Gr. *καθ' ἕκαστον*]: Ger. (1) *einzeln*, (1, 2) *individuell*; Fr. (1) *individuel*, (1, 2) *singulier*; Ital. (1) *singolo*, (2) *singolare*. (1) Applicable, as a sign, to a single individual.

(2) In mathematics: a singular place upon a continuum is a place whose properties differ from those of all other places in the vicinity, so as to constitute in one aspect a discontinuity. (C.S.P.)

Singular or **Individual** (in logic). A term which, during a given discussion, is not to be treated of in separate parts is a singular or individual term.

Like many expressions in logic, the signification is not absolute, but relative to the discussion in hand. Thus 'my palette' may be, upon one occasion, an indivisible object, and upon another it may be thought of as the field for many different colours. The technical definition is this: *A* is singular or individual if for every term whatever, *x*, either no *A* is *x* or else no *A* is non-*x*; in other words, there is nothing, *x*, such that *A* can be partly *x* and partly non-*x*. A proposition containing a singular term is called a 'singular proposition.' (C.L.F.)

Singularism: Ger. *Singularismus*; Fr. *singularisme* (suggested); Ital. *singolarismo* (suggested). A term used (cf. Külpe, *Introd. to Philos.*, § 14) to characterize philosophic schools 'explaining or deducing all the phenomena of the universe from one principle'; opposed to pluralism. See MONISM. (J.D.)

Sinistrality: see DEXTRALITY.

Sinking Fund: see AMORTIZATION.

Situation (social): see SOCIAL STATUS.

Skin: see CUTANEOUS SENSATION, passim.

Skin Sensation: Ger. *Hautempfindung*; Fr. *sensation de la peau, sensation cutanée*; Ital. *sensazione cutanea*. See CUTANEOUS SENSATION, PAIN, PRESSURE SENSATION, TEMPERATURE SENSATION, TOUCH, and HAPTICS.

Slavery: see SERVITUDE.

Sleep [AS. *slæp*]: Ger. *Schlaf*; Fr. *sommeil*; Ital. *sonno*. A normally periodic suspension, more or less complete, of conscious processes, due to organic conditions. Cf. DREAM. (J.M.B.)

The depth of sleep was measured by Kohlschütter (*Festigkeit des Schlafes*, 1862), who found that it increased rapidly for the first hour, then became rapidly lighter, and continued light until waking. Mönninghoff and Piesbergen (*Zeitsch. f. Biol.*, 1883, 114) found a similar curve, with indication of a much shallower deepening of sleep between the fifth and sixth hours. See also Howell, 'Physiology of Sleep,' *J. of Exper. Med.*, ii. 313.

The chief cause of sleep is probably the using up of the highly organized protoplasm in the cells of the brain; during sleep this loss is made good. A secondary cause is generally stated to be accumulation of waste matter (fatigue products) in the blood. Mosso caused appearances of fatigue in a rested dog by transfusing the blood of a tired dog into its veins, but he fails to tell us whether sleep was required for recovery. Yet fatigue of the central nervous system is certainly a predisposing condition. But wakefulness sometimes persists even in conditions of extreme exhaustion, and on the other hand the mere slackening of mental activity is often sufficient to induce sleep without previous fatigue. Animals almost invariably go to sleep when accustomed sensory stimuli are withdrawn. There seems to be no doubt that sleep is essentially connected with alteration in the conditions of the blood supply of the brain. (C.F.H.–J.M.B.)

Abnormalities of sleep may occur as deficiency in amount or nature of sleep (see INSOMNIA); or as excessive tendency to sleep, known as sleep disease or narcolepsy; or as specially prolonged sleep, of which several cases are on record (see TRANCE); or, again, as SOMNAMBULISM (q. v.) or active sleep; or as artificially induced sleep (see HYPNOTISM, and PSYCHIC EFFECT OF DRUGS). The abnormal mental symptoms of sleep are considered under DREAMS (q. v.). It may be noted that mental disturbances, such as attacks of epileptic or acute frenzy, have been known to occur in sleep. (J.J.)

Experiments on the effects of artificially induced loss of sleep have been made by Patrick and Gibert on man (*Psychol. Rev.*, iii. 469), in which determinations are made of the possible length of the waking period, the organic variations induced, and the mental effects (hallucinations, &c.).

Literature: besides the papers cited, see a general résumé of theories by DE MANACÉINE, Sleep; its Physiol., Hygiene, and Psychol. (1897); DE SANCTIS, I Sogni (1899); and

the citations under INSOMNIA; see also the Psychol. Index, v. 6 (successive issues, literature of 1894 ff.). (J.M.B.)

Sleeplessness: Ger. *Schlaflosigkeit*; Fr. *insomnie*; Ital. *insonnia*. See INSOMNIA, and SLEEP.

Smart, Benjamin Humphrey. (1785–1872.) An English grammarian and writer in metaphysics. He claimed to be a follower of Locke.

Smell (sensations of): see OLFACTORY SENSATIONS. An extended bibliography is by Bawden, *J. of Compar. Neurol.*, April, 1901. (J.M.B.)

Smith, Adam. (1723–90.) Born at Kirkcaldy, Scotland, he was educated there, at Glasgow University, and at Balliol College, Oxford, for the Church of England. He gave up the clerical profession, and moved in 1748 to Edinburgh, where, with Lord Kames as patron, he lectured in rhetoric and belles-lettres. Professor of logic at Glasgow, 1751; and of moral philosophy there, 1752. He accompanied the duke of Buccleuch on his travels, and studied political institutions in different countries. Lived (1766–76) in partial retirement with his mother, and wrote his great work, *The Wealth of Nations*. He was Lord Rector of Glasgow University, 1787. His contribution to ETHICAL THEORIES (q. v.) is contained in his *Theory of the Moral Sentiments*.

Smoothness: see ROUGHNESS.

Social Accommodation or **Adaptation:** see SOCIAL DYNAMICS, and cf. ACCOMMODATION (in biology).

Social Compact: see SOCIAL CONTRACT.

Social Consciousness: Ger. *soziales Bewusstsein*; Fr. *conscience sociale*; Ital. *coscienza sociale*. (1) The individual mind so far as it is conscious of referring to or meaning others.

The different ways in which the individual mind may refer to or mean others is one of the important problems of SOCIAL PSYCHOLOGY (q. v.). Social consciousness, however, is a more restricted thing, since it is the consciousness of meaning others. Social psychology takes cognizance of the implication of others, whether the individual is conscious of it or not. That is, there may be elements in the individual's state and in his development which are psychically immediate to him, i. e. not recognized as having social value, although to social psychology they really have. This distinction leads to the more extended meaning that follows.

(2) General or collective consciousness: consciousness so far as it has elements, dispositions, meanings, &c., common to two or more individuals. Cf. GENERAL WILL.

The first meaning is to be preferred, 'general consciousness' being available for the second.

Literature: see GENERAL WILL, and SOCIAL PSYCHOLOGY. (J.M.B.)

Social Contract: Ger. *Staatsvertrag, sozialer Contract*; Fr. *contrat social*; Ital. *contratto sociale*. A supposed agreement entered into by men dwelling together in one place or country to organize a state or political constitution, establish a government, submit to its authority, and obey its laws.

The theory that political society originated in a voluntary compact, or that, at least, it is maintained by agreement, and rests on the consent of the governed, is as old as the Greeks. It was taught by Epicurus (see Fouillée's review of this subject, *La Sci. Sociale Contemp.*, chap. i). In modern times we owe its elaboration chiefly to Hobbes (*Elementa Philos. de Cive*, 1642; *De Corpore Politico*, 1650; and *Leviathan*, 1651) and to Rousseau (*Le Contrat Social*, 1762). Historical students of political science, like Bluntschli and Sir Henry Sumner Maine, have been at much unnecessary pains to prove that in fact the state developed imperceptibly out of tribal life, and is at present maintained largely by force, and have assumed that history therefore discredits the social contract philosophy. This is a criticism which Rousseau in part anticipated. A patriarchal group, or a group held together by force, he said (*Le Contrat Social*, chap. i), is, if you please, an aggregation, but not an association. That is to say, Rousseau taught that a mere population is not necessarily a society, and that society comes into existence only when men begin to make voluntary agreements. This thought has been elaborated by de Greef (*Introd. à la Sociol.*), who makes contract the distinctive phenomenon of society. Spencer (*The Man versus the State*) strongly maintains not only that the doctrine of the social contract is consistent with the theory of evolution, but also that the opposite political doctrines are inconsistent with it. Cf. SOCIAL ORGANIZATION. (F.H.G.)

Social Dynamics: Ger. *soziale Dynamik*; Fr. *dynamique sociale*; Ital. *dinamica sociale*. That division of sociology or the study of that group of social problems which deals with any break up and reconstruction of the social order, with any disturbance and re-establish-

ment of the social equilibrium, or with any change in the rate or direction of social evolution; the theory of social accommodation. (F.H.G.–J.M.B.)

This term was invented by Comte (*Cours de Philos. Positive*, 1830–42) to designate that division of his sociology which treated of the historical progress of mankind. Spencer (*Social Statics*, 1848) used it, in closer analogy to the language of mechanical physics, as a name for the study of the gradual adaptation of society and social man to their physical and organic environment. Lester F. Ward (*Dynamic Sociol.*, 1883) employed it to denote the study of those highest social processes in which intelligence and purpose intervene to supplement and complicate the unconscious processes of cosmic evolution. Cf. SOCIONOMICS, SOCIAL ORGANIZATION, SOCIAL EVOLUTION, and SOCIAL SCIENCES.

Literature: the writers cited; TARDE, Social Laws (Eng. trans.); BALDWIN, Social and Eth. Interpret., §§ 117, 315; see also SOCIOLOGY, and SOCIAL PSYCHOLOGY. (F.H.G.)

Social Ethics: Ger. *soziale Ethik*; Fr. *morale sociale*; Ital. *etica sociale*. (1) Moral principles in their application to social relations and situations. In this meaning, social ethics is a department of what is called applied ethics, which deals with the application of ethical rules to actual matters of conduct in all the spheres of practice.

(2) The type of ethical theory which founds morality genetically (*a*) upon the social life of the individual, (*b*) upon that of mankind, or (*c*) upon both.

The theories of Adam Smith and Hume illustrate (2 *a*), which was the main resource of empiricism in ethics before the rise of the evolution theory. The transition from this view which emphasized sympathy and custom is seen in the work of Leslie Stephen, whose 'social tissue' is a more permanent and racial thing. The evolution ethics as expounded by Spencer brought in theories of the type (2 *b*) based on 'race-experience.' Current empirical genetic views in ethics belong to (2 *c*), a certain coincidence being supposed between the course of the individual's progress under the sanctions of his social education and the evolution of mankind in morality. It is, however, not empiricism alone which may profit by the investigations of social ethics, since it may be held that evolution in the content of morality, both in the individual and in the race, is consistent with nativism of the forms of practical reason, or that the new stages of ethical development are distinct and analysable each for itself—not reducible to, though arising out of, earlier stages. In these ways an ethical idealism may arise on the basis of a science of social ethics.

Literature: see the section (and citations) devoted to evolution theories under ETHICS, and ETHICAL THEORIES; also BIBLIOG. F, 2, *n.* (J.M.B.)

Social Evolution (1) and (2) **Social Progress:** Ger. *soziale Entwicklung und sozialer Fortschritt*; Fr. *évolution sociale et progrès social*; Ital. *evoluzione e progresso sociali*. (1) Social change in so far as it depends upon the continuous operation of the principles which constitute and condition SOCIAL ORGANIZATION (q. v.). Cf. SOCIAL FORCES AND CONDITIONS. (2) Social evolution considered as determined towards some desirable goal; contrasted with social 'retrogression' and 'decay.'

(1) These definitions make social evolution the wider term; it includes any continuous movement in the social whole in which previous change persists and enters into the determination of subsequent change, apart from what is called its direction—which is predictable only in its character, as intellectual, ethical, or other, not in its social form (so Lacombe)—and from the appreciation of it from the point of view of worth.

The definition of social evolution, therefore—like that of all evolution—requires change determined by inner forces and outer conditions, and the continuation, for a longer or shorter period, of the same sort of determination. That is, the antecedents of the change must be generalizable, and reapplicable in different cases of change. The further requisite is that the sphere in which the change occurs shall be adequately marked off—the problem of the definition of what is social.

Within these requirements there are certain theories of social evolution; there are also many more which call themselves theories that do not fulfil these conditions.

(*a*) Physical theories, which hold that geographical and other physical conditions are the sole or principal determining factors in social change. (*b*) Biological theories, which find in society an organism subject to the laws of biological evolution: variation, natural selection, heredity, &c. These two theories are 'socionomic.' See SOCIONOMIC FORCES. (*c*) Psychological theories, which consider the determination of social change

to be in some form mainly psychological, reflecting changes in the minds of the persons organized in society. (*d*) *Sui generis* theories, which hold that there are in social organization certain immanent and peculiar principles of determination in accordance with which all its continuous changes occur; such theories we may call 'autonomic' (see HISTORY).

The problem is extraordinarily complicated, seeing that social evolution carries with it both biological and mental evolution, and the question is mainly the demarcation of a smaller group of changes within these larger groups. The distinction between 'social forces,' on the one hand, and 'extra-social conditions,' on the other hand, has been suggested in the interests of a solution (see FORCE AND CONDITION). The 'social forces' proper are intrinsic sources of change—within the order of phenomena itself—changes which precede other social changes and so determine the latter; 'extra-social conditions' are the phenomena in the larger spheres, physical, biological, psychological, which condition the special social changes as such. The same distinction is required in other departments of science; for example, the chemical changes occurring in living tissues, while not themselves considered vital, are nevertheless 'extra-vital conditions,' so to speak, of the determination of vital change and function. So geographical separation or 'isolation' conditions biological change by limiting mating, but it cannot itself be called a biological principle. See SOCIONOMIC FORCES.

The general principle of RECAPITULATION (q. v.) has been borrowed from biology and applied analogically by Lilienfeld; and Baldwin has used the corresponding principle of psychological recapitulation. Others have pointed out the profound significance of social life as a determining or orthoplastic factor in biological evolution. Cf. ORGANIC SELECTION (5, 6).

(2) Besides the distinction made in the definitions given above, social progress differs from social evolution in a way which the distinction between social forces and extra-social conditions serves to make more plain. Social progress is not only in a desirable direction, whatever 'desirable' in a particular case may mean, but it is necessarily always the same—once fully described, always described—inasmuch as it states the essential action of forces intrinsically and immanently social. But social evolution is liable to many different statements, in different social groups, in succession or simultaneously; that is, it includes the extra-social conditions, with the limitations, intrusions, hinderings, helpings, &c., which they bring, to the working out of the social forces properly so called. We accordingly find here, as in biology, a distinction between what Romanes calls the 'monotypic' and the 'polytypic.' Social progress is monotypic; it depends upon the strictly social, and is in one direction always. Social evolution is polytypic; it expresses the social growth when hemmed and conditioned by physical, biological, and psychological situations and events, and is in many diverging directions. (J.M.B., G.F.S.)

Various theories as to what constitutes social progress are current: physical comfort, material wellbeing, intellectual and moral culture, psychological integration in a recognized whole of rights and duties, civilization (itself liable to equal variations of definition)—all these are advocated. The early socialistic leaders, Saint-Simon and Fourier, and the Radical pamphleteers like William Godwin, conceived of progress as a movement that could not stop short of the perfect political and economic emancipation of the working classes and their intellectual enlightenment. Comte's conception of progress included the growth of positive knowledge and of altruism, but placed the emphasis on the substitution of positivism for theology and metaphysics, resting this on the view that 'society progresses only by ideas' (Barth, as below, i. 30). According to Lacombe the goal is intellectual accumulation and moral 'conciliation.'

Herbert Spencer places emphasis on sympathy and altruism, the social nature, rather than on increasing knowledge, and upon the decay of militarism as an essential condition. Mackenzie (*An Introd. to Social Philos.*) lays stress on (1) material wellbeing, (2) improvement in social organization, (3) improvement in the mental and moral nature of man. (J.M.B.–F.H.G.)

The concept of SOCIAL RETROGRESSION AND DECAY (q. v.) goes with that of social progress, and is liable to the same alternatives of definition.

Literature (in which social evolution and social progress are usually used interchangeably): besides the discussions given in the works cited under SOCIOLOGY and SOCIAL PSYCHOLOGY, see STEPHEN, Sci. of Eth.; ALEXANDER, Moral Order and Progress; MALLOCK, Aristocracy and Evolution; NOVICOW, Conscience et Volonté sociales; TARDE, La

Logique sociale; Le Bon, The Psychol. of Peoples (Eng. trans.); MacKenzie, Introd. to Social Philos.; Federici, Le leggi del progresso (1885); Barth, Geschichtsphilos. als Soziol., i; Lacombe, La Sci. de l'Hist.; Baldwin, Social and Eth. Interpret. (3rd ed.). See also Biological Analogy, and Imitation. (J.M.B.–E.M.)

Social Force: Ger. *soziale Kraft*; Fr. *force sociale*; Ital. *forza sociale*. The ground of social change so far as it is internal or intrinsic to the social organization in which the change occurs. Cf. Force (various topics).

The common confusion between force and energy should be avoided here. In the words of the author of the article on another topic—Energy (q. v.)—'Spencer's exposition of the subject is defective through trying to extend the conception of energy into fields where no transformation of mechanical energy into the concepts of the field is possible.' Energy is amount of change produced measured in terms of exact units. For social change there are no exact units of measurement, and it is impossible to bring over physical units into this field. To illustrate what social energy would be, suppose we assume that one act of imitation by one individual of another is the unit of quantity or mass (m), then in a given case of propagation of an idea in society we would have the kinetic social energy of a series of changes $KE = \frac{mv^2}{2}$, where m is one imitation and v is the rapidity with which such imitations occur—a grotesque aping of physics. (J.M.B., G.F.S.)

A point of great importance in the history of the term is the differentiation of the conception of social force from that of forces that create society. The term has long been inaccurately used to designate the latter. Comte so used it, and the usage was followed by Spencer, Ward, de Greef, Patten, and others. Cf. Force and Condition, and Socionomic Forces. (F.H.G., J.M.B.)

Social Heredity: see Heredity (2), and Tradition (in biology).

Social Logic: Ger. *soziale Logik*; Fr. *logique sociale*; Ital. *logica sociale*. The form of Social Process (q. v.) considered as analogous to the form of union of premises in a logical conclusion.

The terms social logic (Tarde, *La Logique sociale*) and 'mental energy' (Wundt) are used in connection with ways of looking at social evolution more or less analogically. The former considers social organization as analogous with the form of syllogistic reasoning; the latter considers it under analogy with physical energy—a so-called 'law of increase of mental energy' being true of social evolution, while in physics there is conservation of energy. As to the latter view, the remarks made under Social Force would seem to be applicable; the conception of energy has no legitimate application. (J.M.B.)

Social Opposition: Ger. *soziale Opposition* (or *Streit*); Fr. *opposition sociale*; Ital. *opposizione sociale*. Interference or conflict in the operation of Social Forces (q. v.): as in Competition, Rivalry (q. v.), oppression, revolt, &c., considered as involving social forces (cf. Tarde, *Social Laws*, Eng. trans., *Opposition universelle*, and *Psychologie économique*, 1901). (J.M.B.)

Social Organism: Ger. *sozialer Organismus*; Fr. *organisme social*; Ital. *organismo sociale*. The organized body of society considered under the analogy of the physiological or biological organism. See Biological Analogy.

Both the utility and the exact meaning of this analogy are much discussed. The tendency of those who consider society an organism is to depart from the strict biological conception of organism and to give the term a larger meaning. Cf. Organism, and Organization.

Literature: see the references under Sociology, and Biological Analogy. (J.M.B.)

Social Organization: Ger. *soziale Organisation*; Fr. *organisation sociale*; Ital. *organizzazione sociale*. That relation among individuals established, at least in part, by their use of their minds and through their intercourse, and sufficiently stable and progressive to be called an Organization (q. v.); also the process of the rise of such relationships.

The problem of social organization as a genetic and comparative question belongs to general Sociology (q. v.); its investigation under various phases and by different methods belongs to the special Social Sciences (q. v.). As a matter belonging to sociology, two great questions may be separately treated, although it is only by abstraction that this separation is effected: (1) the problem of social matter—what is the matter organized?—and (2) how is this matter organized?—by what method or process?

In answer to the first of these questions, various sorts of matter are held to be intrinsic to social organization: individuals, as such, minds and bodies; minds of any order; minds of a relatively high order; thoughts; beliefs;

desires; volitions; feelings; the social self or socius; whatever is imitable; various combinations of these.

In answer to the question of social method or process, we are told: natural selection; laws of physiological organization and growth; social contract; personal growth as implicating a social group; imitation; constraint and obedience. These are also variously combined.

The philosophy of social organization requires the solutions of these two questions combined in one general principle. The matter which enters into the organization must assume the form of the organization by itself exhibiting the process or method. In other words, it is not possible—as was said above—except by abstraction, to conceive a sort of matter brought into organization by laws or processes which are not *its* processes. The true social forces of change are intrinsic and not imposed. See SOCIONOMIC FORCES, and cf. FORCE AND CONDITION. It is necessary to emphasize this; for when we come to put the test upon various social theories in which answers to the two questions are more or less confusedly given, it is found that matter and process have determinations which forbid their union save in a logical or in a mechanical way.

There is a distinct tendency to accept the view that the matter is psychological—whether thought (Comte, Hegel, Lacombe, Fouillée, Baldwin) in whole or in large part, beliefs and desires (Tarde), or feelings and actions. This has the advantage of allowing the principle of imitation to play as the method or process involved—the questions remaining over (1) as to whether imitation is the whole of the method (Tarde), or an incident of a larger process, such as personal growth (Baldwin); and (2) as to the mental content of the development of which imitation is an intrinsic mode.

Social organization is progressive (cf. SOCIAL EVOLUTION AND SOCIAL PROGRESS), and the principles established in the theory must have here their further play. It is generally recognized that what is called invention supplies the new elements incorporated in social growth; these taken up by imitation become available as social material (so with various modifications, Taine, Lacombe, Tarde, Ll. Morgan, and the present writer).

Literature: that of SOCIOLOGY, SOCIUS, and STATE (philosophy of); an expository work arranged by schools and individuals is BARTH, Geschichtsphilos. als Soziol., i; see also the various topics SOCIAL. (J.M.B., F.H.G.)

Social Philosophy: Ger. *soziale Philosophie*; Fr. *philosophie sociale*; Ital. *filosofia sociale*. Study of the social sciences considered as a department of philosophy; that is, as contributing data to the synthesis of knowledge which philosophy attempts to make. Cf. PHILOSOPHY, SOCIOLOGY, STATE (philosophy of), and SOCIAL SCIENCES. (J.M.B.)

Social Process: Ger. *sozialer Prozess*; Fr. *processus social*; Ital. *processo sociale*. The form of continuous change which the material of social organization undergoes; that process which, when true of a peculiar sort of facts, constitutes social phenomena. Cf. SOCIAL ORGANIZATION. (J.M.B., F.H.G.)

Social Progress: see SOCIAL EVOLUTION.

Social Psychology: Ger. *soziale Psychologie*; Fr. *psychologie sociale*; Ital. *psicologia sociale*. That department of psychology which treats of the individual mind with reference to the implication of other minds in its functions and development.

Social psychology is, on this definition, a more or less arbitrary division of general psychology; its material being taken from the larger body of data, and its problem being to find what is capable, on adequate analysis, of being so treated. This is, however, only one of the current definitions; the scope of social psychology is much discussed in relation to SOCIOLOGY (q. v.) and ETHICS (q. v.).

Literature: works on SOCIOLOGY (q. v.); G. TOSTI, Social Psychol. and Sociol., in Psychol. Rev., v. (1898) 347 ff.; WORMS, Psychologie individuelle et collective, Rev. Int. de Sociol. (Jan., 1899); BALDWIN, Social and Eth. Interpret. (3rd ed., 1902); TARDE, Études de Psychol. sociale; L'Opinion et la Foule (1901); and La Psychol. économique (1901); SIGHELE, La Foule criminelle (Fr. trans., 2nd ed., 1900); P. ROSSI, Psicol. collettiva (1901). (J.M.B., G.F.S.)

Social Retrogression (and **Decay**): Ger. *sozialer Rückschritt* (*und Verfall*); Fr. *rétrogression* (*et décadence*) *sociale*; Ital. *regresso* (*e decadenza*) *sociale*. The undoing of the results of social evolution.

It seems to involve (1) a diminution of social welfare (see SOCIOLOGY); (2) a return from liberal to absolute forms of social organization; (3) a breaking up of compound nations into their component societies; (4) a degeneration of the social nature of individuals; and (5) a dispersion of population.

Social retrogression may begin at any stage in social evolution, in tribal society, or in civilization. The ancients recognized the

facts of social retrogression, and the phenomena have never since been more vividly and accurately described than by the Old Testament Prophets. (F.H.G.)

It is often held, and there is much to be said for it, that social retrogression and decay involve, as does social evolution, ethical disintegration, and, further, that this is the essential fact. Whether this latter statement is true would seem to depend upon what is held as to the nature of social progress. If we find that the fundamental fact, the *sine qua non* of social organization and advance—that which is common to all special forms of social wellbeing and of institutional life—is ethical, then social retrogression is not present unless there be ethical degeneration in individuals. Such a fundamental thing as justice may be interpreted ethically. This question is, however, left open in the point indicated above (4).

The word decay is stronger than retrogression, and seems to apply primarily to the disintegrating process in individuals.

Literature: SCHÄFFLE, Struct. u. Bau des sozial. Lebens; BARTH, Philos. d. Gesch. als Soziol., i, in loc. (J.M.B.)

Social Sciences: Ger. *soziale Wissenschaften*; Fr. *sciences sociales*; Ital. *scienze sociali*. The group of sciences which deal with social AGGREGATION (q. v.).

The following table presents the main sciences of society, SOCIOLOGY (q. v.) proper being contrasted as general with the special departments of research, after a somewhat analogous development to that which the BIOLOGICAL SCIENCES (q. v.) have pursued. Cf. also SOCIONOMIC FORCES, SOCIAL ETHICS, SOCIAL ORGANIZATION, and SOCIAL PSYCHOLOGY.

Giddings (*Princ. of Sociol.*) puts the analytic and descriptive problems first and the historical second, and includes both under 'General Sociology' (q. v., from which certain of the headings are taken).

I. GENERAL.

Sociology:
- 1. GENETIC—
  - i. Evolution
    - *a*. Origin and Descent—
      - Aggregation.
      - Social Variations.
      - Social Transmission.
      - Social Forces.
      - Social Stages, Epochs, Types.
      - Group Selection.
    - *b*. Socionomics (inter-relations *inter se* and to environment)—
      - Intergroup Intercourse (in culture, religion, arts, politics).
      - Socionomic Conditions.
      - Migration.
      - Geographical Distribution.
      - Rivalry (commercial, hostile: war).
      - Social Accommodation.
  - ii. Theory of the Social—
    - Philosophy of Social Organization.
    - Philosophy of the State, or of Right.
    - Ethics of Social Relationships.
  - iii. Mental Evolution and Development, as social—
    - Folk Psychology.
    - Social Psychology (genetic).
- 2. COMPARATIVE—
  - History
  - Institutions
  - Customs, Cults, &c.
  - (Ethnology)

  } being results of the special social sciences (II, below).

II. SPECIAL.

Analytic, descriptive, and quantitative (statistical) Social Sciences
- 1. Social Composition—
  - Unit, Tissue, Social Matter.
- 2. Social Mind—
  - Social Psychology (collective).
  - Social Process or Function.
- 3. Social Institutions—
  - State.
  - Politics.
  - Law and Jurisprudence.
  - Education.
  - Religion.
- 4. Social Welfare and Progress—
  - Political Economy.
  - Ethics.
  - Criminology.
  - Penology. (J.M.B.)

Social (1) Selection and (2) **Suppression:** Ger. *soziale Auswahl und Unterdrückung*; Fr. *sélection et suppression sociales*; Ital. *selezione ed eliminazione sociali.* (1) Conscious selection of one individual by another considered as a factor in social or biological evolution. Cf. SELECTION (in biology, and in psychology).

(2) The social selection of an individual for exclusion from social life: social elimination.

Social selection is illustrated well in matrimony—say, the marriage of a white man to a negro woman in New York—since the result is influential biologically as well as socially: socially, because the children are trained by a woman of low culture and are socially ostracized (social heredity); and biologically, because their strain of negro blood, by shutting them up to negro marriages (except in very rare instances), is continued and strengthened in later generations (physical heredity). This latter point is referred to elsewhere (see SOCIONOMIC FORCES, 3).

The influence of social selection on biological evolution has been recognized in many ways in recent discussion. Wallace calls it 'selective association' in cases in which it brings together groups of animals and practically isolates them for interbreeding (cf. Gulick, *Nature*, April 1, 1897). See ISOLATION. Wallace's RECOGNITION MARKS (q. v.) are also a means of this sort of selection.

Social suppression is illustrated in all measures, either conventional and purely voluntary, as in the isolation of a person shunned by others, or legal and compulsory, as in the imprisonment or hanging of a criminal. Such persons are also physically eliminated, since they are not allowed to have offspring. (J.M.B., C.LL.M., F.H.G.)

Among animals social selection, though influential in determining the course of evolution, is not purposeful; that is to say, the animal does not select with the aim of determining the course of evolution in some specific way. In man social selection may rise to this higher level; and choice may be exercised with the distinctly conceived object of attaining a given social end.

Literature: see SELECTION (in biology), and SOCIAL PSYCHOLOGY. (C.LL.M., J.M.B.)

Social Statics: Ger. *soziale Statik*; Fr. *statique sociale*; Ital. *statica sociale.* That division of sociology, or the study of that group of social problems, which deal with a stable social order, with social forces in equilibrium, with social evolution that does not change in rate, form, or direction.

This term, like SOCIAL DYNAMICS (q. v.), was invented by Comte to designate that division of his sociology which treated of a stable social order and of coexistent social phenomena in distinction from all phenomena of sequence. Spencer, in *Social Statics*, used it to denote a study of social equilibrium, which, according to his reasoning, exists when the interests, motives, and activities of the individual members of society are in balance. This, he held, is attained when every man has perfect liberty to do all that he wills so long as he does not trench on the equal liberty of any other. Cf. SOCIAL SCIENCES. (F.H.G.)

Social Status: for foreign equivalents of STATUS, see that term. The position in society which an individual member, family, community, or class occupies by reason of birth, social tradition, or achievements.

An individual may improve his social status, but only by influencing the minds of his fellow men. The final determination of his social rank, position, or reputation is by a combination of historical and psychological factors objective to himself.

The conception is older than recorded history. In primitive as in the most advanced societies the community recognizes that the individual is for all practical purposes only what his position in the community allows of his being. Cf. CASTE. (F.H.G.)

The idea of social status has been recast in recent discussion, in which social organization has been interpreted as being, in any case, a 'situation' in which the status of each member is reflected more or less adequately in the individual's consciousness of the situation as a whole including himself. Bosanquet (*Philos. Theory of the State*) interprets the fundamental conceptions of social philosophy as relative functions of such a psychological status; e. g. the individual's consciousness of justice and right is a function of his thought of the social situation as involving a series of individuals, each, including himself, having a relative status. The present writer (*Social and Eth. Interpret.*) reaches what he calls a 'self-thought situation,' meaning the individual's thought of the actual social situation as an organization of selves, including himself, having status relatively to one another. (J.M.B.)

Social Suppression or **Elimination:** see SOCIAL SELECTION AND SUPPRESSION.

Social Theory: see SOCIAL SCIENCES, and SOCIOLOGY.

Social Tissue: Ger. *soziales Gewebe*; Fr. *tissu social* (not used—L.M.); Ital. *tessuto sociale*. (1) Those individual members of society who, collectively regarded, are fitted by heredity and habit for normal social life. More specifically, individual members of society who by heredity and habit (mental and moral) are adapted to a particular situation, station, or function in normal society.

The term is employed in the meanings given in the foregoing definitions by Leslie Stephen (*Sci. of Eth.*), but the conception is Platonic, being fully worked out in Plato's *Republic*. (F.H.G.)

(2) Used in connection with the analogy between society and a biological organism to indicate the particular 'tissue'—bone, muscle, &c.—to which this or that group of social phenomena corresponds (Schäffle).

Simiand playfully suggests that the rich are society's 'adipose tissue,' and that the 'priests also represent fat.' (J.M.B.)

Social Unit: Ger. *soziale Einheit*; Fr. *unité sociale*; Ital. *unità sociale*. The irreducible element of social organization; that which includes what is essential to the social as such, and nothing more.

Attempts to determine the social unit have been embarrassed by the varying conceptions of social organization and of social evolution. Atomistic theories of society find a unit which by compounding produces the varied phenomena of social life. So the individual has been treated as the unit, which is in some way brought into combination with others. It is true that the individual is the unit of the social GROUP (q. v.); but he is not the social unit, since the social is a relation of individuals. So others say the social group as such is the unit (see Gumplowicz, *Sociol. und Politik*, 37, 53).

The biological theorists look for a unit analogous to the physiological cell, and attribute to it various 'functions' in the economy of the social organism. The psychological school find the unit in the psychological state which is in some way both individual and common to two or more individuals, so that by its possession a social relation is constituted between or among the individuals. Various constructions have been put upon this, the least requisite psychological state considered as, wherever present, *ipso facto* constituting a social situation. The questions of its origin, development, embodiment, variations, &c., are problems of the different SOCIAL SCIENCES (q. v.).

The conception of unit here, as in psychology, is very misleading, since it is only by an abstraction that any social phenomenon can be considered a unit of quantity for treatment. In all such cases the unit is an arbitrary determination. In MORAL STATISTICS (q. v.) the unit is one case of the phenomenon in question (suicide, theft, &c.). There is no general social unit, and it is doubtful whether in the social sciences any final unit of analysis will ever be discovered in terms of which all phenomena of the class can be quantitatively expressed. The attempt to treat psychology by the theory of COMPOSITION (q. v.) of units has not succeeded. The phrase 'fundamental social fact' used in recent literature better expresses the scope of the inquiry in this field.

Literature: see SOCIOLOGY, and SOCIAL PSYCHOLOGY. (J.M.B.)

Socialism: Ger. *Sozialismus*; Fr. *socialisme*; Ital. *socialismo*. (1) The disposition to rely on political activity, rather than on individual liberty, as a means of securing the people's material welfare.

(2) Specifically applied to certain historic manifestations of this disposition—literary, administrative, or revolutionary.

The word socialism dates from about 1835, and seems to have originated in several quarters simultaneously. Leroux claims to have invented it as an antithesis to individualism. The development of the doctrines of political economy and of civil liberty had led many people to see in enlightened self-interest a panacea for social ills. Socialism was a protest against this view.

Now individualism is not a creed or a platform, but a way of looking at things; and the same thing may be said of socialism, in the first and broader sense. Under these circumstances we cannot expect to find, and do not find, a coherent statement of socialistic doctrine, generally accepted by socialists as a body. A man may easily be a socialist in some senses and an individualist in others. The individualist is the man who in a number of debatable cases believes that the good from freedom outweighs the evil. The socialist is the man who in these same cases believes that the evil outweighs the good. The difference between the two is in many cases a matter of temperament. The man who reasons more acutely than he feels is pretty certain to be an individualist; the man who feels

more acutely than he reasons is likely to be a socialist. For the good of freedom is essentially an indirect one, only to be fully understood by those who are capable of abstract reasoning, and likely to be exaggerated by those who overvalue such reasoning.

But most of the men who are inclined towards socialistic views fall into certain pretty well defined groups; and the name socialism is applied by turns to the creed and platform of each of these groups. It thus acquires in practice a number of specific senses in place of one general sense. The three main groups of socialists are the *administrative*, the *idealistic*, and the *revolutionary*.

The administrative socialist is the man who believes in extending the authority of the existing state, with such modifications as may fit it to its wider sphere of activity. He would give more rights to the officials and less freedom to the individual property-owner. He would regulate the hours and conditions of labour; would provide for factory inspection; would substitute compulsory saving in its various forms (pensions) for voluntary saving; would have state management of means of transportation and other industrial monopolies; would generally favour progressive taxation, inheritance taxes, and other measures designed to put larger proportionate burdens on the rich; and would in many cases look favourably upon strict regulation, if not actual nationalization, of landed property. The administrative socialists are sometimes divided into two sub-heads: the state socialists proper, who go into these measures as a matter of practical politics, and the professorial socialists (Katheder-Sozialisten, Socialistes en chaire), who adopt them as a result of disinterested study. The most advanced form of administrative as distinct from revolutionary socialism is perhaps represented by the English 'Fabian Society.'

The idealistic socialist is apt to be by temperament an artist—a man who feels so keenly the evils of the present system that he is blind to the impracticability of his proposals. He may occupy himself with devising Utopias, like Plato, or More, or Bellamy; or he may appear to stand on more solid ground, like Carlyle or George, and achieve great literary success by that combination of keen perception of present evils with inadequate analysis of the difficulties in the way of reform which appeals so strongly to the sentiment of the reader. Or he may use similar appeals as a means of strengthening the religious feeling and religious organization of the community—a thing often attempted, and sometimes successfully, by Christian socialists, both Catholic and Protestant. The sentiments thus awakened, whether aesthetic or religious, may result in the establishment of socialistic experiments like those of the disciples of Robert Owen, the Brook Farm, or the religious co-operative societies like the 'Shakers'—communistic organizations in the strictest sense of the word, yet absolutely foreign, in their purposes and methods, to the ideas of the Communist League. It is in the nature of things impossible to formulate or classify the proposals of idealistic socialism; its advocates unite only in their condemnation of the present economic organization of human society and their belief in the automatic improvement of human nature when this weight is removed.

The revolutionary socialist feels the evils suggested by the idealist, but does not share his sanguine hopes. He agrees, in general, that the practical reforms suggested by the administrative socialist are desirable, but he thinks that such reforms, if carried out by the officials of governments as they now exist, would only substitute one form of tyranny for another. He overestimates the power of the machinery of government, and believes that if this machinery can really be brought into the hands of the masses all will go well. This idea, well expressed by Rousseau, is the central article in the revolutionary socialist's creed. He is a social democrat—democrat first and socialist afterwards. He is occupied at once with attacking the power of capital (which he thinks Marx has proved to be wholly unnecessary) and the power of governmental aristocracy. For this end he is ready to adopt either constitutional or extra-constitutional means; to join hands with the Fabian or with the Nihilist, as may suit his purpose; to take part with equal readiness in the trades union congress, the parliamentary debate, or the appeal to force. His economic proposals as embodied in the manifestoes of the Communist League or the International have a superficial resemblance to those of the administrative socialists. But fundamentally they are based upon a different idea—the idea that capital is not a power whose abuses are to be checked, but a usurper which consists of nothing but abuses. Considering all value

to be based on labour, he regards capital as being in its origin property withheld from the labourer, and in its continuance a means of withholding further property every year. Constitutional law, as at present administered, he thinks to be nothing better than a means of using the organized forces of society to perpetuate this species of robbery.

It should be said in justice to the great body of revolutionary socialists that these extreme positions have been in a measure forced upon them by the continental governments, whose policy of repression has made it impossible for the moderate socialists among the labouring classes to have a fair chance either outside of Parliament or within it.

Literature: perhaps the best general work on socialism for the English reader is RAE, Contemp. Socialism (2nd ed., 1891). See also MARX, Das Kapital (3 vols., 1867, 1885, 1894); SCHÄFFLE, Die Quintessenz des Socialismus (1875); LEROY BEAULIEU, Le Collectivisme (1884); and Fabian Essays in Socialism (ed. by Shaw, 1890); RUSSELL, German Social Democracy (1896). (A.T.H.)

Sociality or **Sociability**: Ger. *Geselligkeit, Gesellschaftlichkeit*; Fr. *sociabilité*; Ital. *socialità* (or *sociabilità*). Disposition towards intercourse with one's fellows. Cf. DISPOSITION. Not a technical word. (J.M.B.)

Socialization: Ger. *Socialisierung*; Fr. *croissance de sociabilité, socialisation*; Ital. *sviluppo della socialità*. The accommodation of individuals to one another and to a social life. See CONSCIOUSNESS OF KIND, SOCIUS, SOCIOLOGY, SOCIAL CONTRACT, and STATE OF NATURE.

Socialization is accomplished through migration, communication, acquaintance, imitation, the formation of common judgments, co-operation, and common pleasures; the question being left open as to the psychological fact or process which makes them effective. (F.H.G.–J.M.B.)

In the savage state, socialization is almost wholly bounded by kinship, and it is a product chiefly of common pleasures of a rude kind, e. g. the Australian corroboree. In the barbarism of pastoral and nomadic life, socialization is intensified rather than extended. Only when a settled agriculture, and the beginnings of trade, bring together in one community men of varied ancestral experiences, of different tribal origins, does socialization begin on a large scale through a wide extension of acquaintance. It is then, too, that the subordination of rank to rank, of class to class, begins, a process which Simmel and Gumplowicz have regarded as practically identical with socialization—a view which, however, can hardly be defended. Cf. the literature of SOCIOLOGY. (F.H.G.)

Societas leonina [Lat.]. A partnership in which it is agreed that one of the partners shall have all the gains, while the others are liable for the losses.

This term is that used by the Romans, by whose law such a partnership was prohibited. 'Iniquissimum enim genus societatis est, ex qua quis damnum, non etiam lucrum spectet' (*Dig.*, xvii. 2, *pro Socio*, 29, § 2). The French *Code Civil* also forbids such a contract (art. 1855). It would probably be legal by Anglo-American law, the policy of which is to promote freedom of contract (see Parsons, *Princ. of Partnership*, § 48). (S.E.B.)

Society [Lat. *societas*]: Ger. (5) *Gesellschaft*; Fr. (5) *société*; Ital. (5) *società*. (1) A biological COLONY (q. v., meaning 2), for which this latter term is preferable.

(2) Any social GROUP (q. v.), for which this latter term is preferable.

(3) A commercial, scientific, or other organization for a special purpose. Cf. COMPANY (meaning 2).

(4) The public, others; as in the expressions 'the opinion of society,' 'to be in society.' Not technical. (J.M.B.)

(5) A social group characterized by some degree of reflective and voluntary CO-OPERATION (q.v.). 'A number of like-minded individuals who know and enjoy their like-mindedness and are therefore able to work together for common ends' (Giddings, *Elements of Sociol.*). (J.M.B.–F.H.G.)

(6) A naturally formed population occupying a defined territory (e. g. England, France, or the United States), of which, on the whole, definition (5) is true.

In the history of the concept of society, three questions of philosophical importance have arisen, namely:—

(1) That of the essential nature of society (for the history of this question see SOCIOLOGY); (2) that of the distinction between natural and political society; and (3) that of the inclusion of animal groups under the term societies. The distinction between natural and political societies was imperfectly made by Hobbes and Locke, and precisely made by Bentham (*Fragment on Government*, chap. i). Cf. STATE (philosophy of).

Evolutionary studies have carried the investigation of social origins back to animal life, e. g. the writings of Espinas (*Des sociétés animales*). Baldwin (*Social and Eth. Interpret.*) proposed the restriction of the word society as in definition (5), and the use of COMPANY (q. v.) for animal and human groupings and activities that are instinctive, unreflective, and unprogressive (so also in substance Comte; cf. Barth, *Geschichtsphilos. als Soziol.*, i. 32). (F.H.G.)

Socinians: Ger. *Socinianer*; Fr. *Sociniens*; Ital. *Sociniani*. The historical designation of the followers of Laelius and Faustus Socinus, who in their doctrinal beliefs combine a unitarian conception of the divine nature with what is known as the moral theory of the Atonement and the assertion of man's power and free initiative in the matter of his own salvation.

Socinianism originated in Italy in the 16th century, and is the forerunner of modern unitarianism. It differs from Arminianism in its theory of the Atonement and in its denial of the divinity of Christ. It is not, however, to be identified with a purely humanistic view of Christ, inasmuch as it ascribes to him quasi-divine attributes and regards him as a legitimate object of worship. The term, however, covers considerable variation of opinion.

Literature: TOULMAN, Life of Socinus; HARNBECK, Socinianismi Confutatio (1664); DORNER, Hist. of the Person of Christ, II. ii; CUNNINGHAM, Hist. of Theol., ii; TOCCO, L'Eresia nel Medio Evo. (A.T.O.)

Sociology [Lat. *socius*, a companion, + Gr. λόγος, science]: Ger. *Sociologie*; Fr. *sociologie*; Ital. *sociologia*. (1) The genetic and comparative study of social groups; that is, the study of the origin and relationships of social groups as such.

Sociology is thus a general social science, as contrasted with the special social sciences, which deal with the composition, elements, and internal organization of social groups. Cf. SOCIAL SCIENCES, and STATE (philosophy of).

(2) The scientific study of society, including all the special SOCIAL SCIENCES (q. v.). (J.M.B., G.T., F.H.G.)

Comte, in 1838, first used the word 'sociologie' as a name for a division of the *Cours de Philosophie positive*, and, notwithstanding many protests against it as a barbarism, it has held its own in both scientific and popular usage. Komology (from κώμη, a community, a throng, a rout) would have been a better term for the scientific description of organized communities (cf. Barth, *Geschichtsphilos. als Soziol.*, i. 28). The publication in 1873 of Spencer's *Study of Sociology* established both the word and the study in popular favour, and within the next fifteen years no less than four great expositions of sociological knowledge were before the public, namely, Spencer's *Descriptive Sociology* and *Principles of Sociology*, Schäffle's *Bau und Leben des socialen Körpers*, Ward's *Dynamic Sociology*, and de Greef's *Introduction à la Sociologie*.

Comte and Spencer both worked out their systems of sociology as divisions of a cosmic philosophy, rather than as special fields of investigation. Comte's chief purpose was to demonstrate that society could be studied by positive methods, from which theological dogmas, metaphysical assumptions, and revolutionary purposes should all be eliminated. Incomplete as his work was, Comte undoubtedly prepared the minds of educated men for a different way of looking at social order and progress from that which had before prevailed. Actually the scientific study of society by both inductive and deductive methods had been soundly established by Aristotle in the *Ethics*, the monographs on Greek constitutions, and the *Politics*; by Machiavelli, Hobbes, and Locke, in their analyses of political motives; by Grotius and Montesquieu, in the historical study of law and civilization; and by Adam Smith, by both deductive and historical methods, in *The Moral Sentiments* and *The Wealth of Nations*. In none of these works, however, save Aristotle's, were social phenomena dealt with in their completeness, and in none, not even in Aristotle's, was social science clearly discriminated from politics. Comte first pointed out these limitations, and aimed to show what field sociology must cover and to what scientific requirements its methods must conform.

Spencer gave an entirely new and modern character to social philosophy by arguing that all social changes, like all changes in organic nature, must be interpreted in terms of the universal processes of evolution. Social organization, like the organization of cells in the plant or animal body, exhibits the stages of integration and differentiation, and all its phenomena are conditioned by the equilibration of energy between the organized group and its surroundings or environment. The adaptation of the social system and of the

individual units that compose it to their environment is, according to Spencer's views, just as certainly the determining factor in all lesser social changes as is the adjustment of the organism to its environment in all minor physiological changes. In society, however, the important phenomena are psychological rather than physiological, and Spencer emphasizes two psychological principles (both regarded by him as phases of the adaptation of mankind to the conditions of life) as of chief importance in the history of civilization. One of these is, that while fear of the living becomes the root of all political control, fear of the dead becomes the root of all ecclesiastical control. The other is, that habitual militarism and habitual industrialism give rise to opposite types of character, morality, law, government, and social organization. In working out the details of this system, Spencer made extensive use of anthropological and ethnological data. His scheme thus presents three of the four or more possible modes of investigation of social phenomena, namely, the biological or organic, the psychological, and the ethnological. The statistical, first exploited by Quetelet (*Du Système social et des Lois qui le régissent*, 1848), is not much employed by Spencer.

Later work in sociology has emphasized one or other of these methods, and a tendency has appeared among sociologists to group themselves in schools. One of these, starting from such parts of Spencer's work as his essay on 'The Social Organism' (*Westm. Rev.*, 1860), and following the example set by Schäffle in the *Bau und Leben*, is strongly represented at the present time in France, and especially in the writings of Réné Worms. It holds that society is in reality, and not merely in analogy or figuratively, an organism, and that practical social reform awaits the development of a social pathology founded upon a sound knowledge of social anatomy and physiology. By sociologists of other schools all this is regarded as fanciful and of little scientific or practical value. The ethnological school is represented in France by Letourneau, whose ten or more bulky volumes on Social Evolution are the most comprehensive survey of the historical development of mankind yet made by any one writer; in Austria by Gumplowicz, whose *Der Rassenkampf* and *Grundriss der Soziologie* are works of keen insight and great suggestiveness; in Germany by Bachofen, Lilienfeld, Poste, Dargun, Bastian, Ratzell, and Waitz; in England by the two McLennans, Tylor, Frazer, and Karl Pearson; in the United States by Lewis H. Morgan, Franz Boas, and the Bureau of Ethnology; [in Italy, by de Bella, de Marinis, and Mazzarella—E.M.]. All of these have made important contributions to our knowledge of the structure of primitive and of tribal society, including the evolution of the family, clan, and tribe.

While ethnological methods have given us our only exact knowledge of the origin and historical development of society, statistical methods give us our only accurate knowledge of the social phenomena of modern populations: the facts of the distribution of races and nationalities, of emigration and immigration, of birth-rates and death-rates, of marriage and divorce, of partnerships, corporations, and other forms of co-operation, of travel and communication, of pauperism, crime, philanthropy, and religion. Statistical methods have been refined and extended since Quetelet's day, and in every country men of great ability have devoted their best energies to statistical investigation—men like Engel and Meitzen in Germany, Bodio and Morselli in Italy, Levasseur in France, Longstaff, Galton, and Pearson in England, Walker, Wright, Adams, and Mayo-Smith in the United States.

It is, however, only through psychological analysis that the real nature of society and of social processes can be understood, and recent work in sociology has more and more strongly emphasized the psychological factors and conceptions. The psychologists themselves, notably Baldwin and Royce in the United States, have made most important contributions to social psychology in their investigations of the part played by social relations in the evolution of the individual mind. Imitation, invention, and the social judgment have been subjected to thorough examination in their works. Among strictly sociological writings, Bagehot's illuminating book on *Physics and Politics* (1872) broke ground in many new directions, and especially by the importance it attached to imitation and to natural selection as processes of the first importance in social evolution. It was, however, the epoch-marking work of Tarde, *Les Lois de l'Imitation*, which elaborated and firmly established the psychological sociology. Other works by the same author (especially *La Logique sociale*); by Sighele and Le Bon (who have paid especial attention to the psychology of crowds); by Durkheim and Novicow, have traversed large

portions of this field. As psychological sociology must also be classed the work of de Greef in Belgium, who has elaborated the idea of the SOCIAL CONTRACT (q. v.), and of Giddings in the United States.

Whatever method or combination of methods shall ultimately be found most satisfactory, a complete scheme of sociological investigation must include a study of (*a*) the elements or factors that combine in social phenomena; (*b*) the mental activity of masses or communities of men, as distinguished from that of individuals, as such; (*c*) the various forms of social organization; (*d*) the material and moral results of social organization; and (*e*) the historical evolution of society and of social groups and types. The problems of sociology (F.H.G.) or of the SOCIAL SCIENCES (q. v., 2 above, J.M.B.), thus fall naturally into the two groups—problems of historical development (comparative and genetic) and problems of contemporaneous phenomena (analytic and quantitative). Those of the second group (put first by F.H.G.) are naturally subdivided into (*a*) problems of the social population, (*b*) of the social mind, (*c*) of the social organization, (*d*) of the social welfare. The problems of (1) sociology proper (J.M.B.) or the historical development of social association (F.H.G.) or AGGREGATION (q. v., J.M.B.), in like manner fall naturally into the subgroups (i) genetic and (ii) comparative. Under (i) we have (1) zoogenic association (those social habits of animals which were antecedent to human society); (2) anthropogenic association (the beginnings of human society); (3) ethnogenic association (the development of tribal society); and (4) demogenic association (the evolution of civil society); and under (ii), the relations of these forms to one another, with the laws of the evolution of the higher from the lower forms. Cf. the table given under SOCIAL SCIENCES. (F.H.G., J.M.B.)

Literature: COMTE, Cours de Philos. positive (1830–42); SPENCER, Social Statics (1850), The Study of Sociol. (1873), Descrip. Sociol. (1874–81), and Princ. of Sociol. (1876–96); BAGEHOT, Physics and Politics (1872); LILIENFELD, Gedanken ü. die Socialwissenschaft d. Zukunft (1873–5); SCHÄFFLE, Bau und Leben des socialen Körpers (1875–81); LETOURNEAU, La Sociol. d'après l'Ethnographie (1880); DE ROBERTY, La Sociol. (1880); L. WARD, Dynamic Sociol. (1883), Psychic Factors of Civilization (1893), and Outlines of Sociol. (1898); GUMPLOWICZ, Der Rassenkampf (1883), and Grundriss d. Sociol. (1885); FOUILLÉE, La Sci. sociale contemp. (1885); DE GREEF, Introd. à la Sociol. (1886–9); VANNI, Prime Linee di un Programma critico di Sociol. (1888); LASTRADE, Éléments de Sociol. (1889); TARDE, Les Lois de l'Imitation (1890–5), La Logique sociale (1895), L'Opposition universelle (1897), and Les Lois sociales (Eng. trans., 1900); SIMMEL, Über sociale Differenzierung (1890); MACKENZIE, An Introd. to Social Philos. (1890); DURKHEIM, De la Division du Travail social (1893); Les Règles de la Méthode sociologique (1895); SMALL and VINCENT, An Introd. to the Study of Society (1894); GIDDINGS, The Theory of Sociol. (1894), The Princ. of Sociol. (1896), The Theory of Socialization (1897), The Elements of Sociol. (1898), and Inductive Sociol. (1901); SALES Y FERRÉ, Tratado de Sociol. (1894); BALDWIN, Social and Eth. Interpret. (1895, 3rd ed. 1902). Consult also Ann. de l'Instit. Int. de Sociol. (from 1895, ed. by Worms), L'Année sociol. (ed. by Durkheim), and the Amer. J. of Sociol. (ed. by Small). (F.H.G.)

See also under RIGHT (philosophy of), especially the titles by HEGEL, ROUSSEAU, v. IHERING, BARTH, and BOSANQUET. (J.M.B.)

Socionomic Forces. Forces, themselves not social, which condition or direct the operation of SOCIAL FORCES (q. v.) and so enter into the determination of social organization and progress. Cf. SOCIONOMICS (also for derivation and equivalents), and FORCE AND CONDITION.

The relation of these to the social forces properly so called is similar to that which the psychologists recognize between the strictly psychological and the physiological. The various states of the body, such as intoxication, fatigue, starvation, and over-nourishment, affect the mind, and so influence the individual's mental development; but we do not call these psychological forces. They are of psychological value only because, through the sorts of stimulation and limitation which they afford, they condition certain uniform results in the psychological organization itself. The analogy thus cited—between the extra-social influences with the effects they bring about in the social whole, and the extra-mental or physiological influences with their influence upon the individual's mental life—is indeed more than an analogy. When we reflect, we find that it is through the connection of mind and body—one term of the analogy—that the extra-social forces—the

other term of the analogy—get their value. It becomes, therefore, still more apparent that we cannot call the influences enumerated below social forces; for so far are they from showing direct value in the organization of society, that they become factors in that organization only by the indirect road of stimulation to the nervous system of individuals. It would be just as appropriate to call blood-changes psychological facts, as to call physical changes, such as the cutting of the Suez Canal, social facts; yet both undoubtedly deserve recognition in a philosophical statement of all the determining conditions in these two branches of knowledge.

Cf. the present writer, *Soc. and Eth. Interp.* (3rd ed.), sect. 313 a—a passage of which this article is in part a reproduction. It seems that Comte made essentially the same point in distinguishing between what he called 'secondary conditions'—in which he included not only the physical (4, below), but also competition (1 and 2, below)—on the one hand and true 'causes'—the mental factors—on the other hand (see Barth, *Philos. der Geschichte als Soziol.*, i. 33 ff.).

The most important of these conditions are the following:—

(1) Group-selection (q. v.). In group-selection we have a condition of enormous importance in the development of social aggregations, especially in the instinctive and spontaneous periods; that is, so-called 'companies.' It holds, however, for all societies when the conditions are such that groups as groups come into competition. Not only real war, but commercial and social wars of all kinds, illustrate group-selection. Cf. Rivalry (3).

The working of the principle is analogous, indeed identical, with that of natural selection in biology—a point excellently worked out by Bagehot in his remarkable work *Physics and Politics*. It is one of the foundation stones also of S. Alexander's work *Moral Order and Progress*. Bagehot acutely recognizes the distinction, without explicitly drawing it, between group-selection as a condition of evolution in the earliest stages of human aggregation, and the operation of the real social force of 'discussion' ('social generalization') in the higher. It is, moreover, an additional proof that group-selection is a condition, and not a social force, that there is such a difference between the lower and the higher; for the lower are determined, as is said above, very largely by biological principles, such as instinct and physical heredity, and do not involve the social progress which later on the operation of the psychological forces brings in. Yet it is in the lower that group-selection is all-important.

(2) Individual Selection (q.v.), which is natural selection working upon individuals who are brought into competition for life and death with one another. For instance, let us suppose that a man of genius who has not yet given to the world his invention—the machine which, if produced by him, would have great influence upon the condition of the working classes—that this man meets a burglar in his library and is shot dead. Here is a case of natural selection which determines the course of social evolution in a nation or in the world by the elimination of an individual. Such a case shows that the natural selection of individuals is a condition of importance—when the individuals are important—in social development. But it is not a force even in biology. It is a negative condition; a statement—in sociology as in biology—of evolution as it is, the conditions being what they were. This again is of especial importance in those stages of sociality in which the direct competition of individuals by physical strength or mental acuteness is in full operation.

(3) *The intrusion of the 'physiological cycle.'* The 'cycle of causation' which psychological and sociological facts, such as beliefs, desires, &c., represent, often intrudes upon the operation of the 'physiological cycle' by the personal selection of individuals in marriage. The physical heredity of the individuals is due to the mixed strains of the parents, and hence is in part determined by their mutual choice of each other. The converse is also true: the physiological intrudes upon the sociological, and thus becomes an 'extra-social condition' in its determination. This is seen in all cases in which physical heredity works results in individuals or groups which incapacitate them, especially endow them, or modify in any way their social fitness. A tall manly race of men would have social advantages in winning wives from a higher group, and such marriages would tell at once inside their own group. Where social preferment depended upon physical prowess, the inherited club-foot would be an element of social unfitness. In the fact of what is called physical 'presence,' probably largely a matter of posture and vitality, we all recognize an easy substitute in many social positions for brains, culture, or oratorical gifts.

Yet these things are not in themselves social; nor can they by any manipulation become social. The influence they have is entirely through the psychological states of which they are the conditions. A man with the illusion of a club-foot would be as helpless as if it were real. And where is the hero so commonplace that his 'presence' is not lordly to some love-sick maid?

(4) *Physical conditions*: 'the broken earth and the vaulted sky,' the canal and the river-course, the mountain and the meadow. These, we are told, determine social development. They do; but by conditioning it, by intrusion upon it, by limiting it, not by being themselves social. That they are never. Let a race of animals that cannot think, nor recognize a social situation, nor know one another as reciprocating and fulfilling social give-and-take, run over the meadows and swim in the rivers, under a sky never so blue—and what effect of a social kind would these physical things have upon them? But given the psychological traits, make them men—and then what would not the human race do even on the levellest plain? Here again we have extra-social conditions. The land and water condition separation and segregation, competition and mutual defence, toleration and alliance, commerce and confederation; but the essentials of social matter and process must be there, and it is they that work under these conditions or those. Again an illustration from recent biological theory—a case which often turns upon the effects of such physical differences: the facts of Isolation (q.v.) have been said to represent a biological force, since, when animals are isolated from each other, the race is prevented from having the in-mixture of their hereditary strains, and so the heredity of the race is prelimited. True, as a fact; but why make an abstraction do duty for a force? Isolation is always accomplished by some real force—say a whirlwind which blows away the isolated individuals; but the biological forces are the life processes in those which are left. The whirlwind is the condition by which the result has been in a measure negatively determined; but who would say that the whirlwind is a biological force? At the most it is an intrusion of physics into the biological cycle. Just so with all the physical changes considered as influencing social life and development: they are conditions, intrusions from physics; not social forces. (J.M.B.)

Socionomics [Lat. *socius*, companion, + Gr. *νόμος*, law]: Ger. *Sozionomik*; Fr. *socionomique*; Ital. *socionomia* (E.M.). A term suggested to designate the science of the relation of social groups to their environment, including other social groups; analogous to Bionomics, and Psychonomics (see those terms). It is the theory of Socionomic Forces (q.v.). (J.M.B., F.H.G.)

Socius [Lat. term for companion]: Ger. *Socius, Genoss, Gesell*; Fr. *socius, compagnon*; Ital. *individuo sociale*. The self of the individual's consciousness in so far as it implicates another self or Alter (q.v.) in a social situation; called also 'social self.'

The conception of the social self is sometimes made to mean a collective self-consciousness common to a group (Espinas, *Les Sociétés animales*); this is argued against by many (see Fouillée, *La science sociale contemporaine*; and Barth, *Philos. der Geschichte als Sociol.*, i. 150 ff.; cf. also Barth's own view, 153 ff.).

That the socius is, in fact, the normal self, and that the self apart from recognition of social relationships (see Individualism) is an abstraction, was held by Comte (see also Barth, loc. cit., 55, and his preface to Baldwin's *Social and Eth. Interpret.*, Ger. trans.).

Suggested by the present writer (*Social and Eth. Interpret.*) in this general sense, the determination of the content of the socius and its social meaning being different at different stages of growth. See also Ormond, *Psychol. Rev.*, Jan., 1901. (J.M.B.–G.F.S.)

Socrates. (469–399 B.C.) Born and educated at Athens. Took part in three military campaigns, in 432, 434, and 422 B.C. He spent his life teaching the people of Athens, by a dialectic, conversational method peculiar to himself, ideas which he believed necessary to the salvation of the national life of Greece. Condemned to drink the cup of hemlock, technically for 'corrupting the youth and introducing strange deities,' but really because his teachings and method had placed him out of harmony with his judges. He was the teacher of Plato. See Socratic Philosophy, and Socratic Method.

Socratic Method: Ger. *Sokratische Methode*; Fr. *méthode socratique*; Ital. *metodo socratico*. The procedure of inductive approach to generalizations by question and answer; called also the 'dialogic method.'

The Dialogues of Plato represent the Socratic method as having two distinct parts; first the Socratic irony, and second the inductive approach to generalizations by means of question and answer. Many of his hearers were

Sophists, who made great pretensions to wisdom. It was often necessary to refute them by showing the absurdity of the positions they attempted to maintain. For this purpose the Socratic irony was employed. When a teachable frame of mind was secured, a serious attempt was made to discover fundamental definitions, especially of ethical notions, by means of inductive questioning. The Socratic method is rightly honoured to this day, and must indeed be reckoned as an important element in any perfected procedure in instruction. See METHOD (in education).

Literature: XENOPHON, Memorabilia, Bk. IV. chap. ii; much of the literature of PEDAGOGICS (q. v.). (C.DE G.)

Socratic Philosophy: Ger. *Sokratische Philosophie*; Fr. *philosophie socratique*; Ital. *filosofia Socratica*. The philosophy which was determined as to its method, and in part as to its aims, by Socrates. In the broadest sense this would include the so-called 'Socratic Schools' (see SCHOOLS OF GREECE) and their successors. The Stoic Epictetus, for example, constantly appeals to Socrates. In this article the term will be restricted to the philosophy of Socrates and his two most distinguished and all-sided followers, Plato and Aristotle.

In these three we may distinguish (1) a thorough appreciation of the social, political, and moral life of the Greek city, and an increasingly successful effort to analyse this and give its theoretical statement. (2) Springing out of this and developing in connection with it, a growing consciousness of the necessary *method* to be pursued—at first in the discovery of ethical principles, then, more generally, in any scientific investigation. The way here lies from the discussions of Socrates with his teachers and the man on the street, through the more comprehensive and subtle divisions and dialectic of Plato, to the clear consciousness of method formulated in the systematic logic of Aristotle. (3) In Plato and Aristotle the construction of a theory of reality, based, in Plato's case, jointly upon his ethical and methodological views, and, in the thought of Aristotle, upon methodological and physical considerations. (4) An analysis of the aesthetic life in its appreciations and creations. (For this see ART THEORIES, and BEAUTY.)

The thought of Socrates has been preserved mainly in the writings of his two disciples, Xenophon and Plato. In the latter's Dialogues it is sometimes difficult to say what is purely Socratic and what is Plato's own, but in general it is considered that the more distinctly metaphysical discussions, the more elaborate dialectical investigations, and the doctrines connected with the belief in the pre-existence and immortality of the soul (see PSYCHE) fall under the latter class. The problem of Socrates was set by his conviction, on the one hand, that a merely habitual and conventional morality no longer sufficed—'an unexamined life is not worthy of man'—and, on the other, that underneath moral codes and political laws lay a basis for a theory which could justify itself fully to the reason. In the first of these convictions he shared the free thought of the Sophists (see PRE-SOCRATIC PHILOSOPHY), and was accordingly classed with them by the popular mind and by the conservative Aristophanes, who represented Socrates as the arch-Sophist, teaching irreverence, substituting natural agencies for the ancient gods, and training his disciples 'to make the worse appear the better reason.' But whereas the Sophists either did not seek or did not find a new authority to replace the old, an inner law to replace the external code, Socrates both sought and found such a new standard. The Sophists were mainly wandering teachers, with the freedom of life and thought frequently found in the man who has no civic or family resposibilities. For such a life individualism is a natural position. Socrates was above all the citizen of Athens, whose conception of life meant life as a member of a city-state. In seeking to discover what is 'good,' the younger Sophists particularly meant 'good for the individual,' and found as their answer 'the full, uncramped development of the impulses and desires.' Socrates sought '*the* good,' which must commend itself as such to the public-spirited citizen, and which had found expression in laws and institutions. True to the genius of Greek life, he found it in knowledge, in insight. Excellence (*ἀρετή*), which in Homer's day had been manly valour, is now declared to be knowledge; and since it is not to be supposed that a man will intentionally injure himself, as he must do if he misses the good, no one can be regarded as doing wrong (i.e. as pursuing evil) voluntarily. All wrong-doing is due to ignorance. Many, if not most, are ignorant of the true good, and need to be stung into a consciousness of their ignorance. Socrates conceived it to be his duty to enlighten his fellow citizens, to

convince them of their ignorance, and in the fulfilment of this task he incurred that personal resentment which combined with the more general grounds noted above in causing his trial and conviction on the charge of 'corrupting the youth and introducing strange deities.'

It was in the effort to discover the good which is not determined by individual desire, but is universally valid, that Socrates developed his *method*. Assuming that there is such a general good, it ought to be discovered as the common element in all particular instances, and in the ideas of different men. Socrates therefore endeavoured to elicit the opinions of all whom he met, to criticize and compare the views presented, and finally to gain a definition, a general concept. The method of delivering others of their opinions Socrates called his art of 'maieutic' or mental midwifery, and the accompanying profession of his own ignorance was made with a sometimes playful, sometimes satirical 'irony' (see Plato's *Theaetetus* and *Gorgias*). This confidence in the objectivity of the general conception is an illustration of the general Greek position that the mind can apprehend only what already exists objectively—a position which found further illustrations in Plato's doctrine of ideas (below). The method, however, contained the fundamental principle of all scientific inquiry in so far as this analyses facts to find laws or general concepts.

In the Dialogues of Plato we have religious, ethical, theoretical, and artistic interests combining to give a view of the world and of life which has exercised permanent mastery in the world of thought, and furnished apparently inexhaustible suggestion, largely because of this comprehensive inclusion and interpretation of human experience. The ethical, logical, and aesthetic problems develop side by side. The religious conception of immortality and the 'other world' comes in to give definite imagery to the demand for a distinction between the relative and the absolute, between the changing and the permanent, and a metaphysics frames a theory of reality embodying all these elements.

Plato's early ethical inquiries raise the question whether there can be a science of conduct. If all the various virtues may be reduced to one, and this one wisdom, it is apparent that some single principle underlies all the recognized 'goods.' The next question is, What content is to be assigned to the good thus analysed? The Cyrenaics (see SCHOOLS OF GREECE) had suggested 'pleasure.' If this be accepted (cf. the *Protagoras*), wisdom will find its part simply in measuring the more and the less. But there are several reasons why this identification of the good with pleasure cannot be admitted. (*a*) Pleasures cannot be weighed objectively. Their respective values will depend upon who is judge. It is therefore the character or wisdom of the man which determines the value of the pleasure, and not the quantity of pleasure which determines the good. Education aims to teach the young to find pleasure in the right objects—not to find the greatest quantity of pleasure, no matter how or where. (*b*) Knowledge is not merely an agency for measuring values; it is itself a value, an element in the perfect life. (*c*) The aesthetic demand for a complete, harmonious life requires a normal fulfilment of functions, not an intemperate intensification of desires and their gratifications. (*d*) 'The good' is a social category. If it is absurd to call a man good because he is experiencing pleasure, it is because the true good for man is discovered to lie only in the fulfilment of his function in the state. (*e*) Finally—and here the religious conception of the PSYCHE (q. v.) enters to give a new turn—the immortal life of the soul introduces quite another set of values, which are not relative, like the exchange of one pleasure for another, but absolute. Union with God, assimilation in character to God—this is the absolute good.

Plato's logical discussions led to the same culmination. The RELATIVISM (q. v.) of Protagoras (see PRE-SOCRATIC PHILOSOPHY) was admitted to apply to perception by the senses, but declared suicidal if applied to reflective thought (cf. the *Theaetetus*). Knowledge is impossible without the use of such conceptions as those of likeness, difference, and equality. These cannot be discovered by perception. 'The soul discovers the universals of things by herself.' But the soul cannot discover these universals in the particulars of experience. It cannot find a 'one' in the 'many.' There is no absolute equality or absolute goodness in this world. Whence then does the soul obtain such universals? The Greeks did not recognize a creative activity of thought, but the religious dualism already noted afforded an answer. The psyche has seen these universals in its previous existence,

where it has beheld truth, beauty, and goodness absolute—separate from any particulars. The experiences of this world suggest, but do not contain universals. They *remind* the soul of its former vision (cf. the *Meno*, *Phaedrus*, *Phaedo*). Some of the difficulties implied in this theory, according to which particulars which contain no true universal are yet to be known by an external universal, were recognized by Plato (in the *Parmenides*, if this is Plato's) and further developed by Aristotle. The doctrine of 'recollection' or 'reminiscence' is not always emphasized or even mentioned, and may not have been regarded by Plato at all periods of his thought as a necessary element in the system. But the distinction between two kinds of knowledge was fundamental. Perception can give only opinion; reason or reflective thought may give scientific knowledge.

To these two kinds of knowledge correspond two spheres or worlds of reality. The object apprehended through perception is a world of change, of generation and corruption. The reality apprehended through rational thought is the world of true being (*οὐσία*). This world of true being has its characteristics determined by all the *motifs* stated above. As the true home of the soul it has the qualities which Orphic and Pythagorean had embodied in their ideal of the 'other world.' As the world of absolute knowledge it must be the world of universals, separate from particulars of sense, of the changeless 'IDEAS' (q. v.). As the world which is of supreme value, it must be a world in which that intelligence and measure are expressed which belong above all to the good. The 'Idea of the Good' is of controlling significance (*Republic*, *Philebus*), and even in the world of change it finds some manifestation (*Timaeus*). For the maker or Demiurge (*δημιουργός*) of this world looked to the eternal pattern and made the world good and fair. The good, through this mediating conception of a Demiurge or Deity, becomes not merely a static universal, but a dynamic agent, i. e. a causal as well as a conceptual relation is sought. Cf. also WORLD-SOUL, which is another mediating conception. The things of this world are also sometimes regarded as 'participating' in the Ideas, or as copying them as ectypes copy archetypes.

It follows therefore that he who would know the true good, even for human life, must lift his consideration beyond the particulars of sense and study the ultimate good. The ideal state will be governed by the 'philosophers' who seek the absolute good, and their education will be directed to this end (*Republic*).

What Plato had thus sharply contrasted in the two worlds of 'becoming' and 'being' Aristotle attempted to bring together. But he aimed to preserve the values of the universal, and of that other world which Plato had separated from the particulars of experience in his effort to bring out its values. That knowledge involves the reference of every particular to some universal, a deduction from some general, Aristotle asserts in his LOGIC (q. v.). His doctrine of the SYLLOGISM (q. v.) exhibits one form of such a use of the universal to explain a particular brought under it by some middle term. But he insists that the general which is to explain the particular cannot be a separate, abstract universal. For in that case the particulars would still remain particulars, unrelated to it or to each other. And so in conceiving reality, instead of the two unrelated or scarcely related worlds—the one of particulars, the other of universals, the one of changing process, the other of changeless substances—Aristotle substitutes one world of individuals, each of which is neither mere particular nor yet abstract Idea,—neither wholly unrelated to its preceding state, nor yet a static, changeless entity. Reality is conceived as DYNAMIC (q. v.). Aristotle's terminology for this conception (see GREEK TERMINOLOGY) is that everything in nature is both FORM (q. v.) and MATTER (q. v.), both ACTUALITY (q. v.) and POTENTIALITY (q. v.). Motion is the transition from the potential to the actual. The true substance is the individual as thus constituted, and is at once a realization of one form and a potentiality of another. The seed is an actual organization of its material up to a certain stage; at the same time it is potentially a plant. Another analysis or explanation of the individual is that by the four causes (see CAUSE): material, formal, final, and efficient. These four may be distinguished in the case of a work of art. In an organic product of nature the last three are not distinct. One qualification must be added to the above statements. While there can be no matter without form—nothing merely potential with no actuality—there may be Pure Form, complete actuality or energizing. This Pure Form corresponds to Plato's 'Idea of the Good.' Its activity is to be conceived as *νόησις νοήσεως*, self-conscious

reflection. This corresponds to the religious ideal, the deity. This Pure Form is the prime mover, the first cause of all motion, but it operates as a final cause, through the intrinsic longing of matter to take on form. In other words, while the transcendence of the Pure Form is asserted, Aristotle seeks also to avoid reducing the world to the abstract matter of the materialists. It should further be noted that in addition to the conception of matter (hyle, ὕλη) as the potential and as the correlate of 'form,' Aristotle employs the term with a more positive connotation. It is the substratum, the subject of growth and decay, the source of inherent qualities. It is an accessory cause (see IDEALISM).

Aristotle's conception of reality as organized or formed matter found illustration in his view of the soul as the entelechy of the body (see PSYCHE). His aim to unite the elements which Plato separated is well shown in his *Ethics*. The good of man cannot be determined by any 'absolute' idea of good; it must be sought rather in human well-being (eudaimonia). But on the other hand this well-being is to be sought in the complete development or realization of the part of man which is most peculiarly human, to wit, the rational nature. The 'practical' virtues involve a rational control of habit or impulse—the fundamental Greek principle of 'measure' or 'limit' here finds its place—and may be regarded as each a 'mean' between extremes; but still higher than the practical virtues stand the intellectual. The highest ideal is found in contemplation of the truth.

The general change in emphasis towards a more completely intellectual conception of the meaning of wisdom, which is disclosed in the development from Socrates to Aristotle, finds expression not only in this ethical ideal, but in the whole scope of Aristotle's investigations. The whole field of existing knowledge was surveyed; new investigations were undertaken in such widely diverse provinces as those of comparative politics, literary criticism, psychology, and comparative anatomy; many sciences were practically organized *de novo*. Finally, the increasingly theoretical trend from Socrates is illustrated in the respective attitudes towards the state. Socrates was eminently a citizen of Athens, caring not to live unless he could live in Athens and influence its life by his teaching. Plato, in disgust with the actual city which could put to death its teacher, constructed in the *Republic* an ideal state whose pattern was 'laid up in heaven.' The philosopher's citizenship is in this better city. Aristotle is at one with Socrates and Plato in recognizing the social and political nature of man, but the changed political situation which had one type of expression in the individualism of the Stoics, Epicureans, and Sceptics, favoured in Aristotle a scientific and theoretical rather than a reforming or idealizing temper. His work on *Politics* is largely an historical and comparative study of the various forms of polity. Plato's *Republic* has been the inspiration of religious and social ideals. Aristotle's *Politics* furnished conceptions for secular theories of the basis of institutions.

Literature: PLATO, Dialogues, trans., with introds., &c., by Jowett (3rd ed., 5 vols., 1893); ARISTOTLE, Psychology, ed. by Wallace (1882), excellent French ed. by Rodier (1900); Ethics, trans. by Hatch (1879), Peters (1887), Welldon (1892), and others; Politics, trans. by Welldon (1888), and by Jowett (1885–8); Rhetoric, trans. by Welldon (1886); Poetics, trans. by Wharton (1883), trans. and ed. by Butcher as Aristotle's Theory of Fine Art (1895); On Parts of Animals, and Youth and Old Age, &c., by Ogle (1897); ed. and trans. of the Metaphysics by Bonitz; ed. of Ethics by A. Grant; KRALIK, Sokrates (1899); ZELLER, Socrates and the Socratic Schools (1885); Plato and the Older Academy, Aristotle and the Elder Peripatetics (1897); GOMPERZ, Greek Thinkers (1900); JOEL, Der echte u. d. Xenophontische Sokrates (1893–1901); GROTE, Plato and the other Companions of Socrates (1865); EUCKEN, Die Lebensanschauungen d. grossen Denker (2nd ed., 1898); H. v. STEIN, Sieben Bücher z. Gesch. d. Platonismus (1861 ff.); MEIER, Syllogistik des Aristoteles (1896–1901); GROTE, Aristotle (1872); NETTLESHIP, Philos. Lects. and Remains (1897), and Essay on Plato's Theory of Education, in Hellenica; GREEN, Aristotle (in Works, iii, 1889); BRADLEY, A.'s Theory of the State, in Hellenica; Histories of Philosophy by UEBERWEG-HEINZE, WINDELBAND, ERDMANN; BENN, The Greek Philosophers (1883). For accounts of recent literature see reports by ZELLER in Arch. f. Gesch. d. Philos. See also PSYCHE, and PRE-SOCRATIC PHILOSOPHY. (J.H.T.)

Solger, Carl Wilhelm Ferdinand. (1780–1819.) Born at Schwedt in Uckermark, he was educated at Berlin, Halle, and

Jena Universities in philology, jurisprudence, and philosophy. In Jena he heard Schelling, and later, in Berlin, Fichte. Owing chiefly to the influence of the latter he gave up the practical pursuits which had before occupied his attention, and in 1804 devoted himself to learning. He became Privatdocent in Berlin, and studied Spinoza as well as Fichte and Schelling; habilitated (1809) in Frankfurt a. d. Oder, and lectured in philology and philosophy. In 1811 he moved to Berlin as professor of philosophy. There he died.

Solidarity (social) [Lat. *solidus*, firm]: Ger. *Solidarität* (cf. SENTIMENT, social); Fr. *solidarité*; Ital. *solidarietà*. The union of individuals in a social whole, together with the social sentiment which characterizes each of the individuals (see Barth, *Philos. der Geschichte als Sociol.*, i. 27, with exposition of Comte's view). Cf. SOCIAL ORGANIZATION, SOCIAL TISSUE, and SOCIUS. (J.M.B., F.H.G.)

Solidity: see IMPENETRABILITY, and MATTER.

Solipsism [Lat. *solus*, alone, + *ipse*, self]: Ger. *Solipsismus*; Fr. *solipsisme*; Ital. *solipsismo*. Subjective IDEALISM (q. v.) as follows in (1) to (3):

(1) As theory of knowledge: the doctrine that since knowing is a subjective process in the mind of an individual, what is known must always be either the self or some modification of the self. Or, stated negatively, the doctrine that nothing can be known except the self and its modifications or states.

(2) As metaphysics or theory of reality: the doctrine that nothing but the self exists.

(3) Subjective idealism as metaphysics is often used to cover theories, like that of Berkeley, which deny the independent existence of an external material world, although such theories do not usually deny that some reality in addition to the individual subject exists, and hence cannot be properly called solipsism.

(4) Kant uses the word as an ethical term (*Werke*, ed. Hartenstein, v. 77) in the sense of self-seeking, practical egoism, but this has not been followed by English writers. Cf. SELF-LOVE, ad fin.

The argument for solipsism is thus stated by Bradley: 'I cannot transcend experience, and experience must be *my* experience. From this it follows that nothing beyond my self exists, for what is experience is its (the self's) states' (*Appearance and Reality*, 248).

If the attitude of solipsism is defined rigorously, it would be difficult to name historic representatives of the theory. It may, however, be taken as the limit towards which certain theories logically tend, if consistently pursued, and hence in the following, the tendencies coming under (3) above will be noted as well as the more rigorously defined solipsism.

Speaking generally, modern philosophy from the time of Descartes, as contrasted with ancient philosophy, has found its starting-point in self-consciousness, and has viewed the existence of other reality than itself as a matter of inference rather than of immediate certainty. Ambiguities in the conception of the 'self' have led to a confusion of the position that all experience and all objects of experience must be within consciousness, and the metaphysical position, on the other hand, that the consciousness, or the 'self' just referred to, must be regarded as an exclusive subjective process. The subjective direction was given to modern philosophy by the position of Descartes, that knowledge of the self is the primary certainty, whereas the existence of God and of an external world may be doubted, until these are seen to be necessary grounds of certain ideas found within the self. This view, that the existence of all except the self and its ideas is a matter of doubt or inference rather than of immediate knowledge, is called by Kant 'problematic idealism.' Locke takes a similar attitude, maintaining that 'since the mind hath no other immediate object but its own ideas, which it alone does or can contemplate, it is evident that our knowledge is only conversant about them' (*Essay*, IV. i. 1). He, however, holds that we have an 'intuitive knowledge of our own existence, a demonstrative knowledge of the existence of a God, a sensitive knowledge of some few other things.' Metaphysically, Locke has no doubt of the existence of a world of things corresponding to our ideas—except as regards the secondary qualities of colour, sound, &c.—but he admits that its existence cannot be demonstrated. Berkeley, agreeing with Locke that immediate knowledge is only of the self and its ideas, and that the existence of God is demonstrable, denies the existence of an independent material world, on the ground that to suppose such an existence would commit the absurdity either of supposing that conscious sensations or ideas could exist apart from consciousness, or of supposing that some entity, which is not itself an idea, could be like an idea. A similar position as

regards the existence of a material world was reached by Arthur Collier (*Clavis Universalis*), but, like Berkeley, he did not question the independent existence of God and other spirits.

Descartes, Locke, and Berkeley had all assumed the self to be an independent substance, or self-existing entity, and had relied upon the principle of causality to demonstrate the existence of God as a distinct entity. Hume assailed both these positions. He accepts unreservedly the doctrine that all the contents of experience must be some aspect or mode of 'consciousness.' Our world is the 'world of the imagination,' and we can never transcend this. But the concept of cause cannot be relied upon to carry us beyond our own perceptions. The existence of any external cause for our impressions is a matter concerning which we can make absolutely no affirmations. The impressions may be produced by God, by external objects, or by the mind. Belief in the existence of an external world is due to a propensity to feign a separate and continued existence for our perceptions. While, therefore, Hume did not dogmatically assert the sole existence of the self, he had reached the position which Kant characterized as 'a scandal to philosophy and to human reason in general,' that we should have to accept the existence of things without us (from which we derive the whole material of knowledge for our own internal sense) on faith only, unable to meet with any satisfactory proof an opponent who is pleased to doubt it.

Kant sought to meet this position of solipsism by better analysis of the meaning of self-consciousness. He maintains that while all objects of knowledge are necessarily objects of consciousness, the distinction between subject and object, or between the empirical 'self' and the outer world, is a distinction within consciousness, and not a distinction between consciousness and something outside of consciousness. In fact, the external is logically prior to the internal, since it is only as contrasted with the external that the internal self, as existing in time, is definitely conscious of itself as such. Kant, however, was not entirely consistent in his expressions upon this point, and as certain of his later fragments show, he connected the proof for the existence of objects within consciousness with the proof of the existence of things by themselves, since an appearance without something that appears would be a logical absurdity.

Fichte, though making the 'I' the central principle of his system, was not a solipsist, for the 'I' of his science of knowledge was not the individual. His problem was rather the analysis of the general conditions of consciousness. Mill, in his definition of the external world as permanent possibilities of sensation, repeated the Berkeleian analysis. Recent discussions between Neo-Kantians and Realists (see Realism) have turned very largely upon ambiguities above referred to.

Literature: Külpe, Introd. to Philos., 194 f.; Bradley, Appearance and Reality, chap. xxi; Ladd, Philos. of Knowledge, chap. vii; Erhardt, Metaphysik, chap. x; Schubert-Soldern, Grundlagen einer Erkenntnisstheorie, chap. iii; Leclair, Beitr. z. einer monistischen Erkenntnisstheorie, 113 ff.; Hamilton, Notes B and C in ed. of Reid; Mill, Exam. of Hamilton, chaps. x f.; von Hartmann, Neu-Kantianismus u. Schopenhauerismus; Volkelt, Erfahrung u. Denken; Bergmann, in Zeitsch. f. Philos., cx; König and Hartmann, ibid., xcix, ciii f., cviii f.; Seth, Ritchie, Tufts, in Philos. Rev., 1893–6; Zeller, Vorträge u. Abhandl., iii. 225 ff. (J.H.T.)

Solon. (cir. 638–cir. 558 B.C.) A native of Salamis, and a merchant by education and profession, he travelled much in Greece, Western Asia, and Egypt, acquiring the knowledge which made him the statesman and lawgiver of his native city. He was the first archon of Athens, and gave to the city the democratic organization which led to its greatness. He died during the war against Pisistratus. He was one of the greatest of 'law-givers' and was one of the 'seven wise men' of ancient Greece. See Code (in law).

Solution [Lat. *solutio*, from *solvere*, to melt]: Ger. *Lösung*; Fr. *solution*; Ital. *soluzione*. (1) The solution of a geometrical problem consists in: (*a*) describing a construction; (*b*) proving that that construction would satisfy the requisita of the problem; (*c*) proving that the construction is possible when the problem has any solution.

(2) The solution of an equation or system of equations has various meanings in different branches of analysis. Only in elementary algebra does it mean giving an algebraical equation of which the unknown forms one member while no unknown enters upon the other side.

(3) The answer to a general speculative problem of pure deductive logic: how can a given form of relationship hold good? (C.S.P.)

Soma [Gr. σῶμα, body]: same in other

languages. The mortal portion of the body in opposition to the sexual elements, which continue the life in the next generation. Cf. GERM-CELLS.

In this sense the term has been used only since the publication of Weismann's theories (see his *Germ-Plasm*). (C.S.M.)

Following Weismann, somaplasm is used for the substance and tissues of the body constituting the soma in contrast with the germplasm of the germ-cells. Only the latter, on Weismann's view, are the bearers of heredity, modifications of the somaplasm having no effect on the next generation. Cf. WEISMANNISM. (J.M.B.)

Somaplasm: see SOMA.

Somatology [Gr. *σῶμα*, body, + *λόγος*, discourse]: Ger. *Somatologie*; Fr. *somatologie*; Ital. *somatologia*. (1) A synonym for physical anthropology, or the study of the physical part of man.

The use of this term would avoid the confusion between the several meanings attached to anthropology, as well as meeting the need for descriptive adjectives in connection with it. Somatology as a division of anthropology includes an account of the structure of the human body, the skeleton, and internal organs; the proportions of the parts of the body (ANTHROPOMETRY, q. v.) and the special study of the brain; the developmental and comparative facts in regard to the body and body-growth; and throughout, the utilization of all these facts for the differentiation of man from his nearest animal kin, as well as the differentiation of human races, tribes, peoples, nations, or special classes (men of genius, criminals, &c.). It would thus constitute, in the most comprehensive sense, the description and systematic exposition of our entire knowledge regarding the body, with special reference to the application of such knowledge to the problems of anthropology. See for further details and for literature ANTHROPOLOGY, and ANTHROPOMETRY.

(2) In theology: see PSYCHOLOGY (empirical and rational). (J.J.)

Somatopleure (in embryology) [Gr. *σῶμα*, body, + *πλευρά*, wall]: Ger. *Somatopleura*; Fr. *somatopleure*; Ital. *somatopleura*. The primitive wall of the body formed by the union of the ectoderm and outer or somatic leaf of the mesoderm.

The term was introduced by Michael Foster in 1875. It is often used incorrectly in Germany to designate the somatic mesoderm.

Literature: FOSTER and BALFOUR, Embryology; F. M. BALFOUR, Compar. Embryol. (1881); MINOT, Human Embryol. (C.S.M.)

Some (in logic): Ger. *einige*; Fr. *des, quelques*; Ital. *alcuno, qualche*. (1) The mark of a 'particular' proposition, i.e. of that modification of the subject of a proposition which limits the predication to an indefinite part of the subject class. See PROPOSITION, IV.

It is thus equivalent to 'at least some' and does not assert or deny concerning all; i.e. it is not equivalent to 'only some' (see definition 2). (J.M.B.)

(2) A mark which fits a proposition to be the precise denial of a universal proposition. Cf. ALL (2). (C.S.P., C.L.F.)

The latter definition is held by those who hold that the particular asserts the existence of the subject while the universal does not. This is, however, a matter for difference of opinion. Definition (1) is the commonly accepted one. (J.M.B.)

No practical difficulty need arise from this difference of opinion: it is only necessary to add statements of such existences as the parties to the discussion believe to be involved. (C.L.F.)

Somnambulism [Lat. *somnus*, sleep, + *ambulare*, walk]: Ger. *Schlafwandeln, Somnambulismus*; Fr. *somnambulisme*; Ital. *sonnambulismo*. Literally, walking in one's sleep; more generally, a mental condition of partial sleep, or intermediate between sleep and waking, in which purposive acts are performed.

Talking, singing, writing, answering questions in sleep without awaking, may thus properly be regarded as instances of somnambulism. The presence of a sleep condition is shown by the limitation of sensibility, frequently by the closure of the eyes, by the unimpressiveness to ordinary stimuli, and by the complete forgetfulness of what was done during the somnambulic state. Some of the senses are automatically alert, particularly the muscle sense: thus somnambulists rise from their beds, properly direct their steps, avoid obstacles, and walk along dangerous places, such as the parapet of a roof, with safety and freedom from fear. In other cases hearing is responsive to suggestions made by bystanders. In many cases the train of thought carried out is a continuation of that with which the mind was occupied during the day. The oft-quoted instance of the mathematician who was surprised to find written out at his

bedside the solution of a problem which he had vainly attempted during the day, illustrates the automatic continuation of mental activity and the presence of a delicate muscle sense in the guidance of the hand in writing (provided it happened!).

The case of a girl who found in a later somnambulistic condition the locket which she had hidden in a former (but the whereabouts of which she could not recollect in her waking state) illustrates the connection of one somnambulistic state with the others. For these and other reasons the state is allied to HYPNOSIS (q. v.) and other forms of automatism, which by reason of this analogy first received the name of artificial somnambulism. In a few cases (mostly hysterical women) the somnambulism occurs spontaneously, apart from the nocturnal sleep, and corresponds most closely to the hypnotic condition. States of religious ecstasy are often of this nature, and were termed by the older writers 'ecstatic somnambulism.' When the plastic rigidity of the limbs was present (see CATALEPSY) the condition was termed 'cataleptic somnambulism.'

The tendency to somnambulism, i. e. simple nocturnal walking, talking, &c., is an index of nervousness, and is a symptom often met with in the life-history of nervous disorders. It is often, also, merely an incident of rapid growth, or of temporary conditions such as indigestion. The more developed forms of somnambulism are almost invariably associated with abnormal functional conditions of the nervous system. Cf. HYSTERIA.

Literature: CARPENTER, Ment. Physiol.; TUKE, Sleep-walking and Hypnot. (1884). (J.J.)

Son of God: Ger. *Gottessohn*; Fr. *Fils de Dieu*; Ital. *Figlio di Dio*. The name of Jesus Christ which indicates his divine as distinguished from his human nature and origin, and also his relation to the Father in the Trinitarian conception of the Godhead. See CHRIST.

Literature: see CHRIST, and CHRISTOLOGY. (A.T.O.)

Sonant: see PHONETICS.

Sonometer: see LABORATORY AND APPARATUS, III, B, (*b*), (3).

Sopater: see ALEXANDRIAN SCHOOL.

Sophism [Gr. σοφός, wise]: Ger. *Sophisma, Trugschluss*; Fr. *sophisme*; Ital. *sofisma*. (1) The best authorities, as Trendelenburg (*Elementa Logices Aristotelis*, 5th ed., § 33), define a sophism as an intentionally deceptive syllogism.

It is evident that, so defined, the science of logic cannot concern itself with them; and accordingly some logicians have maintained that this was not the proper definition, a contention in which they were aided by the circumstance that Aristotle in his book of *Sophistici Elenchi* omits entirely the class of fallacies which a writer upon the subject would naturally think of first.

(2) A false argument which, without deceiving, is difficult to refute logically.

Although logic cannot concern itself with reasonings intended to *deceive*, as such, yet it has the nearest interests with pretended arguments intended to 'wind up' an antagonist, so that he does not know how to reply to them, and in the early days of the science they, no doubt, contributed much to the development of it. They are occasionally useful still. To be so, the less they deceive, while the more unanswerable they seem, the better. (C.S.P.)

Celebrated sophisms or paradoxes (for which the logics—Prantl, *Gesch. d. Logik*, Eisler, *Wörterb. d. philos. Begriffe*, &c.—should be consulted) are the 'Achilles,' the 'arrow,' the 'heap,' the 'ignava ratio' arguments, and in connection with the theory of PROBABILITY (q. v.), the 'Petersburg problem.' (J.M.B.)

Sophistry (1) and (2) **Sophists** [Gr. σοφιστής, a Sophist, in general a clever or wise man, from σοφός, wise; more specifically, a teacher or philosopher]: Ger. (1) *Sophistik*, (2) *Sophisten*; Fr. (1) *sophistique*, (2) *Sophistes*; Ital. (1) *sofistica*, (2) *Sofisti*. (1) Fallacious reasoning intentionally employed, from the alleged practice of the Sophists, who were charged by their critics, Plato, Aristophanes, and others, with an unscrupulous use of quibbles, ambiguities in terms, and other fallacies, by which they made the worse appear the better reason.

(2) Teachers of various subjects, especially rhetoric and oratory, who came into prominence in the second half of the 5th century B.C. Socrates was popularly identified with them (see SOCRATIC PHILOSOPHY). The more important Sophists were Protagoras of Abdera (about 480–410 B.C.), Gorgias of Leontini (483–375 B.C.), Hippias of Elis, Prodicus of Ceos. The chief sources are from their opponents, e. g. Aristophanes in the *Clouds*, Plato in the Dialogues, *Protagoras, Gorgias, Theaetetus, Cratylus, Euthydemus*, and *Sophist*. Cf. also Xenophon's *Memorabilia*, II. i. 21, for Hippias. For their position and teaching see PRE-SOCRATIC PHILOSOPHY.

Literature: M. SCHANZ, Die Sophisten

(1867), and the literature under PRE-SOCRATIC PHILOSOPHY. (J.H.T.)

Sophists: see SOPHISTRY AND SOPHISTS, and PRE-SOCRATIC PHILOSOPHY.

Sorcery and **Soothsaying:** Ger. *Magie*; Fr. *sorcellerie, magie*; Ital. *magia, stregoneria.* An art founded on the belief or pretence that the powers supposed to preside over nature can by the performance of certain spells or incantations be controlled for the production of phenomena beyond the ordinary powers of man or nature. See MAGIC.

Sorcery and soothsaying have been associated mainly with the spirits of evil. But their secret, so far as they have any, seems to be identical with that of magic in general. The rôle played by magic in ancient and mediaeval life constitutes an important chapter in human history. The mediaeval art of which Paracelsus was one of the most famous practitioners, but which numbered among its adherents some of the most distinguished names in science and philosophy, rested on a theosophic basis, and grew out of the sciences, if such they may be called, of alchemy and astrology. As a matter of fact the art, in so far as it had any real basis, rested on a knowledge of nature which was as yet a mystery to the public.

Literature: HOWITT, Hist. of the Supernatural (1863); FABART, Hist. philos. de l'Occulte, Magie, &c. (1885); FROST, The Magicians. See MAGIC. (A.T.O.)

Sorites [Gr. σωρείτης, a heap]: Ger. *Kettenschluss*; Fr. *sorite*; Ital. *sorite.* (1) A name (Valla) for a chain of syllogisms, the conclusion of each forming a premise of the next.

Only one kind of sorites is commonly recognized in logic, but according to the way of arranging the premises it is called Goclenian or (without reason) Aristotelian. The latter brings into juxtaposition the two occurrences of each middle term. (C.S.P.)

(2) Applied to a Megarian sophism of the 'heap.' Cf. SOPHISM. (J.M.B.)

Sorrow [A.S. *sorg*]: Ger. *Trauer*; Fr. *tristesse*; Ital. *tristezza.* Synonymous with (1) GRIEF (q. v.) and (2) REGRET (q. v.).

Soteriology [Gr. σωτήρ, deliverer]: Ger. *Erlösungslehre*; Fr. *sotériologie*; Ital. *soteriologia.* That branch of Christian theology which treats of the salvation of man through the atoning and redemptive work of Jesus Christ.

The current statement that the early Christian thinkers developed the theological and anthropological departments of general theology, while its soteriology was left largely to post-Reformation thinkers, contains a measure of truth. A more accurate conception, however, will be obtained by distinguishing between the theological and anthropological aspects of Christology, and bearing in mind that while the early thinkers were chiefly interested in determining the doctrine of Christ's nature and relation to the Godhead, later thought has been chiefly concerned with the human side of Christ's work and the scheme of salvation growing out of it.

Literature: BAUER, Die christl. Lehre v. d. Versöhnung (1838); RITSCHL, Die christl. Lehre, &c. (1870); EDWARDS, Justification and Wisdom in Regeneration; A. A. HODGE, Theology, ii; SHEDD, Hist. of Doctrine, i. 201–386. (A.T.O.)

Soul (1) and (2) **Soul Theory:** Ger. (1) *Seele*, (2) *Theorie der Seelensubstanz* (see TERMINOLOGY, German, 'Seele'); Fr. (1) *âme*, (2) *théorie spiritualiste*; Ital. (1) *anima*, (2) *teoria dello spiritualismo.* (1) The mental principle considered as a substance separate from the body, having personal individuality and identity, of which the individual mental life and development are manifestations. Cf. MIND, SPIRIT, NOUS, PSYCHE, and PNEUMA.

On the historical development of the concepts soul and mind, see the extensive citations given under the topics 'Seele' and 'Geist' in Eisler, *Wörterb. d. philos. Begriffe.* The Greek usage divided the meaning between νοῦς and ψυχή, seeing that the conception had a later development in the scholastic and patristic literature, in which the Latin term is *anima.* See the lexicons of Biblical Greek (especially Hastings and Cheyne, *Dicts. of the Bible*), and Hebrew (especially *New Heb. Lexicon, B. D. B.*). (J.M.B.)

(2) The theory that there is a substantial human soul, independent of the body, of which the individual mental life and development are manifestations.

The soul theory is part of the substance theory, which recognized a dualism between mind and body. Its more recent rivals are phenomenalism, actuality theory, and the various forms of quasi-materialism and automatism, to which the phrase 'psychology without a soul' has been applied.

Literature: recent discussions are LOTZE, Microcosmus; JAMES, Princ. of Psychol., i. 180ff., 343 ff., and index, 'Soul Theory'; S. HODGSON, Met. of Reflection; LADD, Theory of Reality, chap. xv; ROYCE, The World and the Indi-

vidual, sect. ii; MONTAGUE, A Plea for Soul Substance, 2 arts., Psychol. Rev. (1899); DE SARLO, Il concetto dell' anima nella psicologia contemp. (1900). See also the literature of SPIRITUALISM, and of IMMORTALITY. (J.M.B.)

Soul (in theology). The non-corporeal and spiritual individuality of man. That which thinks, wills, and feels, conceived as a perdurable entity and a subject of conscious spiritual experience; the spiritual principle in man. Cf. SOUL AND SOUL THEORY.

Theologically, the soul must be distinguished from the body, inasmuch as immortality is predicated of the soul. A threefold distinction (called TRICHOTOMY, q.v.) is sometimes made between body, soul, and spirit, in which case soul is conceived as a middle term between the bodily organism and the spirit. In general, when soul and spirit are not used synonymously, soul represents spirit in potentia, while spirit is the developed energy of the soul in the sphere of moral and religious experience.

Literature: see THEOLOGY, and IMMORTALITY. (A.T.O.)

Sound: see HEARING, II, and TONE.

Sounds (vocal): see PHONETICS, and cf. SPEECH.

Sovereignty [L. Lat. *superanus*, supreme, through Fr.]: Ger. *Souveränität*; Fr. *souveraineté*; Ital. *sovranità*. Sovereign power; the power of the person or persons supreme in a political community and not subject to any other person or persons. Cf. STATE (philosophy of).

The term sovereign is correlative to the term subjection, and both are implied in the term 'political community' (see STATE OR COMMUNITY). According to Austin, where the bulk of the members of a society are habitually obedient to a given person or body of persons, and that person or body of persons is not habitually obedient to any other person or body of persons, that society is an independent political community, and that person or body of persons is sovereign, the other members of the community being in a state of subjection. Austin speaks of obedience on the part of the bulk of the society in question, because in every society there is a criminal class which is not in habitual obedience; and of habitual obedience, because a great many persons occasionally disobey the sovereign. Again, he speaks of the political superior as not being in habitual obedience to any other person or body of persons, because almost all political superiors have occasionally been obliged to obey the orders of other potentates. According to Austin's description of sovereignty, sovereignty is a matter of fact, not of law or courtesy, and the sovereign, in his sense of the term, is often quite distinct from the person or persons so entitled. According to Austin, sovereignty is incapable of legal limitation, since the political superior who could be bound by law would be the subject of a higher authority. He would of course admit the reality of moral and physical limitation. Further, according to Austin, all law is the command of the sovereign, for unless he enforces obedience, a rule is destitute of that sanction which distinguishes legal from moral rules.

This description of sovereignty is very useful as giving us an abstract conception which may help us in classifying and describing actual sovereigns. But there are few cases in which it tallies with all the facts of political association. Austin was unduly influenced by consideration of the most civilized societies, especially of the Roman empire and the United Kingdom. The historical development of sovereignty, like the historical development of the political community, has been slow. The ruling authorities of the family, the village, and the city have merged only by degrees in the ruling authority of the state. Ecclesiastical authorities have divided sovereignty with political authorities. In modern times the desire to divide powers and balance authorities so as to hinder oppression has produced constitutions (notably that of the United States) in which it is hard to discover any sovereign such as Austin describes. Austin considers legislative power the distinguishing attribute of sovereignty, but except in the most civilized communities direct legislation is rare, and the ruling authority is chiefly concerned with the interpretation and enforcement of law. The only authority whose power is always free from legal restraint is the public opinion, not necessarily of the whole community, but at all events of the effective portion of it, whether priests or warriors or nobles or rich or educated, or however else determined.

Literature: HOBBES, Leviathan; LOCKE, Civil Government; ROUSSEAU, Contrat Social; BENTHAM, Fragment on Government; AUSTIN, Jurisprudence; MAINE, Early Hist. of Instit.; HOLLAND, Jurisprudence. (F.C.M.)

Sovereignty (of God): Ger. *Unumschränktheit* (*Gottes*); Fr. *souveraineté* (*de*

Dieu); Ital. *sovranità* (*di Dio*). That unconditional control which God by inherent right of his nature is supposed to exercise over the world, and especially over man and his spiritual destiny.

The great issue which arises in this connection is that between God's sovereignty and man's free and responsible agency. This issue constitutes the great watershed of theology, and Christian thinkers have been Augustinians or Pelagians according as the supreme emphasis was placed on one side or the other. The ancient issue has been fought out in modern times between Calvinism and Arminianism. The classical utterance in behalf of the divine sovereignty in modern thought is that of Jonathan Edwards, who asserts God's inherent right to the absolute disposal of his creatures.

Literature: Augustine, Anti-Pelagian Treatises (ed. Bright); cf. Mozley, The Augustinian Doctrine of Predestination; Anselm, Concordia praescientiae et praedestinationis; Calvin, Institutes, I. xvi ff., III. xxi ff.; cf. Scheibe, Calvin's Prädestinationslehre; Jansen, Augustinus; Zanchius, De Praedest. (trans. by Toplady); Turretin, Inst. Theol., Loc. iv; Edwards, The Will, and The Divine Decrees; Cunningham, Hist. Theol., chap. xxv; Kuyper, Calvinism. A very full bibliography is given by Copinger, A Treatise on Predestination. The relevant sections in the best Biblical theologies should be consulted, especially Dillmann on O. T. and Holtzmann on N. T. (A.T.O.)

Space [Lat. *spatium*]: Ger. *Raum*; Fr. *espace*; Ital. *spazio*. The abstraction of the mutual externality of objects actually perceived or thought as coexisting in possible experience, and represented as a continuous homogeneous magnitude of three dimensions, infinitely divisible and limitless in extent. The philosophy of space treats of the logical and real nature of that which is so represented.

The first Greek thinker to attempt a definition of the nature of space was, as Aristotle tells us (*Phys.*, iv. 2, 209 b 17), Plato; Aristotle himself was the first to elaborate the problems and investigate them systematically. The way for these inquiries, however, had been prepared. Anaximander's qualitatively 'unlimited' substance was also boundless in extent; it gives birth to innumerable worlds, and still, as Hippolytus reports (*Ref. Haer.*, i. 6), encompasses them all. Similarly of Anaximenes' 'air.' Among the Pythagoreans 'the unlimited' appears to be identified with pure space. All things are 'number' which, in reference to physical things at least, is conceived geometrically. The ultimate units are points. Bodies are geometrical solids (Plut., *Plac.*, ii. 6, 5). The world is formed from a fixed centre by successive determinations of adjacent portions of 'the unlimited' (Arist., *Met.*, xiv. 3, 1091 a 17), the cohering portions being separated from one another by intervals of 'the void.' Outside the boundary of the world is an infinite, also conceived, apparently, as empty space (Arist., *Phys.*, iii. 4, 203 a 1). Yet it would be a mistake to suppose that the Pythagoreans thought of 'the unlimited,' 'the void,' and solid bodies as pure abstract space or determinations of pure space, for of the infinite beyond the stars they thought, as Aristotle tells us (ibid. iv. 6, 213 b 22), as 'infinite breath' which the world inhaled. Space is conceived realistically and with only partial abstraction from its content. 'The unlimited' is at once infinite space and infinite stuff, and in general it seems truer to say that space is thought of as a material substance than to say that matter is thought of as pure space.

Till the time of Plato the question with regard to space which then interested philosophers was primarily the question as to the existence or the non-existence of empty space. The Eleatics, Empedocles, and Anaxagoras denied its existence. Zeno, indeed, is generally thought to have gone still further and to have denied the existence of any space whatever; but this is probably a mistake. His argument, as reported by Simplicius (*Phys.*, iv. 562, 3–6), runs thus: 'If space (or place, ὁ τόπος) is, it must be in something; for everything that is is in something, and so in space. Space then will be in space, and so *ad infinitum*. Therefore space is not.' But the major premise, 'everything that is is in something,' cannot possibly have been held true by Zeno, for it is completely at variance with the Eleatic conception of Being. But it may very well have been urged against the Parmenidean doctrine of the One Being, considered as a physical plenum 'equal in all directions' and 'equally contained within limits,' that such a being must exist somewhere, and that therefore there must also 'be' empty space surrounding it. It is altogether probable that it is this objection which Zeno here meets, exposing, on the objector's own assumptions, the inconveniences for thought which arise when space is thus abstracted from body and regarded as a thing apart. If this interpreta-

tion is correct, the argument is directed not against the existence of space absolutely, but against the existence of empty space [1]. The Atomists, on the other hand, believed that empty space was necessary to explain motion.

It is the metaphysically more fundamental idea implicit in the Pythagorean theory, the idea of the identity of space with matter, which Plato takes up and which he first explicitly formulates, setting it forth from the point of view of his own more developed philosophy in a new light. He distinguishes space (*Tim.*, 49 ff.) both from ideas and from sensible things which are their copies. It is a third class of being, resembling ideas in that it is eternal, indestructible, and ever the same, but differing from them in that it is, in itself considered, utterly formless and void. It differs, moreover, from both ideas and things in being apprehended neither by reason nor by sense, but by a sort of 'bastard reasoning' (λογισμῷ τινὶ νόθῳ), a phrase indicating perhaps that, while abstract space can be thought 'pure,' it is not, like the proper objects of intelligence, metaphysically real. It is, however, the substrate (ὑποδοχή) which 'receives' all things and so takes on different appearances according to the character of that by which it is informed. Plato likens it to the mother, the father being the idea, the child the sensible thing, its image. How space becomes impregnated by the idea, and how sensible things are generated in it, he does not explain; on the contrary, he fully recognizes the mysteriousness of the relations thus metaphorically referred to. He speaks of space as a thing fairly incredible, difficult of explanation, most difficult to comprehend. The more precise interpretation of his thought will depend on the view taken of his philosophy as a whole. Viewed as a consistent system of absolute idealism, in which is merged a subjective idealism as regards the relation of the material world to finite percipients, space, one aspect of the 'other' present along with true 'substance' in the world-soul, will appear perhaps as the immutable and eternal law of finite perception, the form in which finite intelligence apprehends the ideas existing in infinite intelligence. And this will then be Plato's meaning: space is just a form of sense-perception. But though there is much, especially in the *Timaeus*, to suggest this interpretation, most commentators think that Plato is less explicit than this, and the subject is too complicated to be discussed here [1].

In striking contrast with Plato's speculative treatment of the subject is the abstractly logical discussion of Aristotle in the fourth book of the *Physics*. The discussion here takes the definite form of an inquiry concerning the space (ὁ τόπος) in which any object is situate. That such space exists distinct from body is proved by the fact that different bodies successively occupy the same space. Moreover, it has its own positive character, for the relations in it of up and down, &c., are fixed in nature and are not relative to us or like mathematical magnitudes, whose positions are determined by thought. But what is it? What is its 'genus'? It cannot be a body, for then two bodies would be in the same place. But neither can it be a pure object of thought, for such objects have no magnitude. Nor is it, again, any of the four 'causes': it is neither the matter of which anything is composed, nor its determining form, nor its efficient cause, nor its end. Again, if it exists, where is it? as Zeno so effectively asked. And if it coincides in size with the body it holds, when the latter grows, must not it grow with it? These perplexities, which Aristotle presents in his usual 'aporetic' fashion, show clearly enough the difficulty of regarding space as a really existent 'thing.' Proceeding to the development of his own views, Aristotle examines at some length Plato's identification of space and matter. His main argument equally applies against its identification with form; it is that matter and form are inseparable from things, whereas space is separable and contains things [2]. His

[1] See Bäumker, *Problem d. Materie in d. griech. Philos.*, 61. Cf. Burnet, *Early Greek Philos.*, 330. Zeno's arguments against multiplicity and motion, framed, apparently, with reference to the Pythagorean doctrine of the composition of space-things out of separate space-units, do indeed prove indirectly, by reference to the infinite divisibility of space, the absurdity of regarding space as independently real.

[1] The view referred to is ably maintained by R. Archer-Hind in his edition of Plato's *Timaeus* (London, 1888).

[2] Aristotle's criticism of Plato is unsympathetic as usual. He sees no difference between their respective problems. He misrepresents Plato in making him say only that space is matter, his real doctrine being rather that matter is space. This he conceives as wholly homogeneous and immovable. Sensible things are modes of its manifestation. Change of place would be, therefore, metaphysically speaking, not at all a translation of matter, but a readjustment in the relations of the sensible appearances, generated by ideas, in the one unchangeable space. Of course there is the difficulty, which Aristotle does not fail to notice, as to the participation in space of unspatial ideas; but the objection tells equally against Aristotle's own doctrine of 'form.'

reply to Zeno is, that there are other ways in which a thing may be 'in something' than by being in it as a place; it may be in it, e. g., as a ἕξις or a πάθος; we are not, therefore, necessarily involved in the infinite regress. But if the space is neither matter nor form of the body, it is either the interval between its boundaries (διάστημά τι τὸ μεταξὺ τῶν ἐσχάτων) or the boundaries themselves. Aristotle rejects the former of these hypotheses on the ground, apparently, that it implies the separability in nature of the interval or body's extent, with the consequence that every space must both contain an infinite number of spaces and must itself be in a space. He adopts, therefore, the remaining hypothesis and defines the space of a body as the limit, more particularly as 'the first unmoved limit of the containing body' (τὸ τοῦ περιέχοντος πέρας ἀκίνητον πρῶτον, loc. cit., 212 a 20).

With this definition Aristotle believes that he meets all the difficulties, for it explains space not as a thing in space, but as a stable relation between bodies. And it has this as a consequence, that it gets rid at a stroke of empty space as an entity existing either within the world or without it. 'Heaven,' the world's outermost boundary, and accordingly the world itself taken as a whole, is for Aristotle not in any place, for no body exists beyond it to limit it. But the definition, valuable as it is as the first suggestion of the relational idea of space, is manifestly faulty. Granting that space is but the abstraction of corporeal relations, and that, apart from such relations, it has neither existence nor significance; granting even the finiteness of the material world, despite the representation which necessarily makes every boundary related to space beyond as well as to space within, still it cannot properly be said that either space in general or the space occupied by a body capable of moving out of it is merely a boundary or limit. A spatial limit is itself a determination of space which serves to determine a space, but is not a part of the space included within it. And the attempt to determine that in turn by limits would seem to be frustrated by the infinite divisibility of space. Aristotle's definition is, in fact, not a definition of space, as such, at all; it is merely a statement of the way in which the place of a physical body in space is to be determined. And even so it shows little appreciation of the subtleties connected with the idea of spatial limit or boundary. What, for example, becomes of the unmoved limit when the enclosing body moves? In view of these difficulties, and in view of the ambiguities in the statement itself, it is not surprising to find that the definition was rejected not only by the Platonizing Simplicius, who criticizes it severely in a lengthy excursus in his commentary on the *Physics*, but also by Aristotle's own disciple and successor, Theophrastus. Theophrastus inclined to the view that a space consisted in the arrangement and position of bodies[1].

After Aristotle the discussion was again taken up concerning the existence of the void, the Epicureans maintaining its existence both within the world and outside it, the Stoics denying its existence within, but holding that it extended infinitely beyond[2], while Strato conversely denied it for the outside, but, to account for the interpenetration of bodies by lighth and warmth, assumed it for within[3]. With the Stoics, again, matter, and hence space, is infinitely divisible; with the atomistic Epicureans not even space is infinitely divisible[4]. In these discussions the realism in the conception of space is full-blown. Nothing of any value is contributed to the elucidation of the conception, unless we except the purely formal distinction of the Stoics between the space filled by a body (τόπος), the void (κενόν), and space (χώρα) which includes both (Stob., *Ecl.*, i. 382). With the Neo-Platonists, on the other hand, space must be an expression of, or an element in, the world-soul, and, in a sense, ideal; but a modern reader can find little that is clear in their confused and contradictory accounts of it. Plotinus says, in apparent disagreement with Plato, that the space a body fills is not matter, since bodies must first have matter before they can be in space (*Ennead.*, ii. 4, 12). Iamblichus, who makes space a genus including both the corporeal and the incorporeal, and the deity the ultimate place of all things, says that perhaps bodies occupy space only κατὰ συμβεβηκός, and that a space, a surface, and 'the substrate' are the same thing; he defines their place physically now as the surface of the surrounding, now as that of the surrounded body, and again as the force which holds them together

[1] Fr. 21, 22, Zeller, *Philos. d. Griechen*, II. ii³. 831 f. For Simplicius see Zahlfleisch, 'Die Polemik des Simplicios (Corollarium, 601–45, des Commentars ed. Diels) gegen Aristoteles' Physik, 1–5, über den Raum,' *Arch. f. Gesch. d. Philos.*, 85–109.

[2] This was the common view; Posidonius, however, considered it finite.

[3] Zeller, op. cit., II. ii³. 909.

[4] See Bäumker, op. cit., 309.

and makes their extension[1]. Proclus regarded space as the purest light, corporeal but immaterial (Simpl., *Coroll. de loco*, ed. Diels, 612).

From the foregoing brief survey of opinion among the Greeks it appears that there was a general agreement among all schools that space was something objectively real and not merely relative to us. The opposite view was implied perhaps in the empiricism of Protagoras and other forms of Greek scepticism, but it does not seem to have been developed to a positive doctrine. Even the Eleatics probably formed no exception, in spite of the logic which, strictly taken, would make not only space but everything thinkable an illusion[2]. And although the idealistic systems did not regard it as absolutely real, as did the materialistic systems with their doctrine of the void, but rather as an element in a world constituted of mind, yet they too would seem not to have considered it as a mere mode of representation in finite souls apart from their participation in the universal world-soul. But there was the greatest diversity of opinion with regard to the nature of its reality. With some (materialists) it is a sort of second entity along with body; with others (Pythagoreans, Plato) it is the matter which is determined to body by the action of some higher principle; then, again, it is an internal energy which gives extension to bodies (Iamblichus) or a quasi-immaterial body (Proclus). With Aristotle, on the other hand, taking it in its determinate character as the place of body, it is regarded attributively as a relation. Then, again, there was a difference of opinion as to its extent. Aristotle, believing the world to be finite, was bound to assert the finiteness of space, thus introducing a contradiction between real and mathematical space. Parmenides held a similar opinion. The general opinion was that it was infinite. This involved the contradiction of the completed infinite. The same contradiction was involved, relatively to the infinite divisibility of space, in the Pythagorean doctrine of the unit. The dialectic of Zeno developed these contradictions. Thus already in Greek philosophy are represented all, or nearly all, of the fundamental differences of view possible regarding the nature of space: space is either objective or subjective, either real or ideal, either a thing or an attribute or a relation, either finite or infinite, either composed of ultimate units or infinitely divisible. Many of the difficulties connected with these various views are also more or less clearly indicated.

The great schoolmen—Albertus Magnus, Thomas Aquinas, and Duns Scotus—commented subtly on the fourth book of Aristotle's *Physics*, but the characteristic mediaeval interest in the question of space is theological. Space is a creation. Intelligible space, therefore, precedes real space. Beyond the confines of the material universe, 'imaginary' space stretches *in infinitum*. The question then was, how can God, a pure spirit, be omnipresent in the immensity of real space without being extended or localized? Aquinas answered, by his power, essence, and omniscience (*Sentent.*, I, 37, 1, 2; *S. T.*, I, 8, 3). But even so the contradiction remains of a real infinite and infinitely divisible whole summed up in a single act, or else the idea of real space as such a created whole, and consequently the idea of intelligible space also, would seem to be an illusion. Later, when Copernican astronomy suggested the illimitableness of the material universe, men like Nicholas of Cues and Giordano Bruno expressed the logic of the contradictions involved in real infinity in the doctrines of the *coincidentia oppositorum* and the identity of maxima and minima[1]. On the formal side, the statements in the old philosophical lexicon of Goclenius may fairly be taken as representing the prevailing opinions: 'Spatium est aliis intervallum finitum, in quo aliquid est vel esse potest. . . . Aliis spatium est capedo, seu intervallum vel finitum vel infinitum' (*Lex. philos.*, 1067).

The characteristic advance made by modern philosophy lies in the development of the subjectivistic view of space. The opposite doctrine, however, was long the prevailing one. Descartes made extension the essence of corporeal substance (*Med.*, vi; *Pr. Philos.*, ii. 10–8), believing not only in its reality, but in the infinite divisibility of its parts (*Letters to Mersenne*, 115, 119). Spinoza made it one of the attributes of God (*Eth.* i, Prop. xv, Sch.). Locke, while rejecting the Cartesian identification of space with body, held no less strongly to its objective reality, though, professing to have no clear idea of substance, he refused to express any opinion

[1] Zeller, op. cit., III. ii³. 706.
[2] See in proof the *Parmenides* of Plato.

[1] Cf. Renouvier, *La Critique philosophique*, Suppl. 5 (1882), 281 f.

as to whether it was a substance or an accident (*Essay*, ii. 13). Newton taught the reality of absolute space (*Princ.*, 6, ed. 1726), regarding it as the sensorium, as it were, in which God had immediate perception of the material universe (*Optics*, App.). The Newtonian doctrine was upheld by Samuel Clarke in his famous controversy with Leibnitz[1], in which he declared space to be an immediate and necessary consequence of the existence of God, the property of an incorporeal substance, and the place not only of bodies, but also of ideas (Fourth and Fifth Replies). Leibnitz, on the other hand, contended that space was nothing but an order of coexistences, as which it continued to be defined in the Leibnitzian school. Strictly interpreted, the Leibnitzian doctrine makes space a subjective phenomenon, bodily extension being but the representation in unspatial monads of their mutual exclusiveness, their 'passive force'; but the laxer interpretation, according to which space, as such, and not merely its analogon, is objectively and metaphysically real, was the commoner[2]. The subjectivistic trend is characteristic of British philosophy. After Hobbes, contradicting other parts of his system, had defined space as 'phantasma rei existentis, quatenus existentis,' and had declared it to be 'imaginarium quidem, quia merum phantasma' (*De Corp.*, vii. 2), and after Locke had opened up that pathway of ideas from which no pathway of philosophy appeared to lead back to the common-sense assumptions of existence he had started from, the decisive step was taken by Berkeley of asserting absolute space to be a phantom (*Sir.*, 271), pure space the mere possibility of bodily motion (*Pr.*, 116), and extension in general, along with the other sensible attributes of matter, merely ideas in us. The most effective of his arguments is derived from the perception of magnitude: as every assignable magnitude of a body depends on subjective conditions, it is vain to suppose the existence of an absolute magnitude (*First Dialogue between Hylas and Philonous*). Hume's scepticism will not allow him to say anything regarding existence absolutely, but his analysis of the space element in our experience is similar. Attacking the assumptions of the infinite divisibility of space and the exactitude of mathematics, he affirms that 'the idea of space or extension is nothing but the idea of visible or tangible points distributed in a certain order' (*Treatise*, Pt. II. § 5).

But the doctrine of the subjectivity of space which stands prominent above all the doctrines of space in modern philosophy is the Kantian. It is the modern doctrine *par excellence*, representative in the same sense in which Aristotle's doctrine was representative of Greek philosophy. Kant's views, as set forth in the *Critique of Pure Reason*, are in substance as follows: (1) the idea of space is not empirical in its origin, since in referring a sensation to a place *in* space, it is already presupposed; (2) it is *a priori* necessary, since we cannot think it non-existent, though we can well think everything contained in it non-existent; (3) it is not a general conception under which species or individuals are subsumed, but an intuition in which all particular spaces are contained; (4) it is represented as an infinite given magnitude; (5) the apodictic certainty of geometry, an *a priori* science of space determinations, can be explained only on the theory that space is merely the form of external perception. He concludes that space is nothing inhering in the nature of things *per se*, but is merely the subjective condition of sensibility, under which alone external perception is possible to us. In the antinomies which result from taking the extended sensible world as independently real, he found a striking confirmation of this theory. The uniqueness of the theory becomes evident when we compare it with the views of previous thinkers. The leading opinions in modern times have been: (1) that space was something real, independent of the human subject, either the essence of corporeal substance (Descartes) or the property of a substance (Spinoza), containing all bodies or even all things (Newton, Clarke); (2) that it was purely subjective, being given in and with particular impressions of sight and touch (Berkeley); (3) that it was subjective as representation, but also objective, so far as the perceptions of sense represented an analogous order of relations in things themselves (Leibnitz). Kant's doctrine is opposed to, and at the same time mediates between, all three. It holds with the first that space is an all-embracing something, so far as concerns the things in space, but this something is our form of intuition; it holds

[1] The writer calls attention to the note in Kuno Fischer's *Gesch. d. n. Phil.* ii, 2. Aufl., 42: 'Wir schreiben den Namen "Leibniz," nachdem festgestellt worden, dass der Philosoph selbst sich nie anders geschrieben.' [Both spellings are allowed to stand in this work—J.M.B.]

[2] See Vaihinger, *Commentar zu Kant's Krit. d. reinen Vernunft*, ii. 147, 416 ff.

with the second that space is subjective, but distinguishing between the general form and the particular content of experience, denies that it is empirically given; and it holds with the third in opposing a world of things *per se* to the world of our sense-perceptions, but making the opposition still sharper, finds no ground for applying the conception of space as extensive magnitude to anything but the latter.

A full account of the discussions growing out of Kant's doctrine would fill volumes: every point has been attacked and defended over and over again. The more important criticisms relate to (1) the alleged subjective source of the idea; (2) the doctrine that space is *merely* subjective; (3) the proof of this from geometry; (4) the proof from the antinomies. The doctrine in (1) is rejected, of course, by all empiricists. Others find the argument vitiated by psychological assumptions concerning the origin of ideas; they deny that the elements in experience can be separated, in the way Kant tries to separate them, into those which have their source in the subject and into those which do not; they hold that experience is both subjective and objective throughout, and see in Kant's formulation of his doctrine a faulty expression of the truth that, reflecting on the constitution of its experience, the mind discovers that space is logically presupposed as a condition of its possibility, and is in this sense *a priori*, but only in this sense. As regards (2), it was early contended, and later notably by Trendelenburg in his controversy with Kuno Fischer[1], that Kant's arguments, even granting that they suffice to prove the subjectivity of space, fail to prove that it is not also objective, and that Kant, in drawing his conclusions (1st ed., 26), overlooked the possibility that it might be both. The objections rest, partly at least, on confusion. For if 'objective' means valid of objects, this is precisely what Kant asserted was true of space relative to the objects of possible experience. If, on the other hand, 'objective' means having an existence *per se* apart from relation to possible experience, Kant cannot be said to have overlooked this possibility, since his argument was expressly designed to refute it. If space were a property of things-in-themselves, he says, we could not determine its nature *a priori*, 'for no determination of objects . . . can enter into our intuition before the actual existence of the objects themselves.' Such knowledge, he says elsewhere (*Proleg.*, § 9), would be unintelligible—it could only rest on inspiration; the doctrine in this reference of pre-established harmony seemed to him fantastic. Nevertheless, there is force in the contention that Kant's argument does not disprove the possibility of a natural conformity of the constitution of our minds to the constitution of things, and it is plausible to assume this conformity, assuming that our knowledge is real. This assumption again may be carried out in many ways, leading to many different theories of space. (3) Kant assumes as the foundation of his theory the apodictic certainty of Euclidean geometry. This assumption eminent mathematicians have since contested, chiefly on the ground that Euclidean geometry rests on an indemonstrable hypothesis concerning parallel lines. Other hypotheses are therefore equally possible; and on them accordingly other systems of geometry, containing notions of the constitution of space widely divergent from the Euclidean, may be, and indeed have been, constructed. The necessity, therefore, which Kant's theory was intended to explain does not exist. It is admitted that non-Euclidean space cannot be separately intuited, and this agrees with the Kantian doctrine of the relative subjectivity of space as we actually intuite it: other forms of space are possible; but, on the other hand, this very possibility shows the merely factual or empirical character of at least all that in our intuition in which Euclidean differs from non-Euclidean space. At best, therefore, it is not our form, but only some form, of space which can be regarded as *a priori*, i. e. as the indispensable prerequisite of a possible experience[1]. Finally, as regards (4) Kant's proof from the antinomies, its value is denied by all who, like Wundt (*Syst. d. Philos.*, 352 ff.), resolve the apparent conflict into a mere 'Scheingefecht,' or who, like Lotze (*Met.*, §§ 106 ff.), find the same or similar contradictions in Kant's own theory. Others, without following Kant closely, admit the general principle involved; Renouvier, for example, concluding from the contradiction in the conception of the actual infinite that space is a pure intuition and its infinity merely potential (*Traité de logique gén.*, i. 50),

[1] For a full account of this dispute see Vaihinger, op. cit., ii. 290–326.

[1] So e. g. B. A. W. Russell, *The Foundations of Geometry* (Cambridge, 1897); F. Medicus, 'Kant's tr. Aesth. u. d. nicht-eukl. Geometrie,' *Kantstudien*, iii. 261.

while Bradley makes space 'mere appearance' on the ground that it is dialectical and contradictory through and through (*Appearance and Reality*, Bk. I. chap. iv).

The general result of the discussion of Kant's doctrine has been to produce a widespread conviction that space is nothing absolutely real, either as a thing or as a determination of things; but also, on the other hand, that it either is or represents more than a mere form with which we invest the objects of our perception, but which, apart from our perception, has no sort of reality in the nature of things. For even if the general representation of objects as external in space be regarded as due to the subjective conditions of our sensibility, the compulsion we are under to represent their space relations in a definite order affords the strongest motive for regarding those relations at least as objectively determined. Accordingly, in the great systems of idealistic philosophy which succeeded the Kantian criticism, we find, even with Fichte in his later period, that the externality of phenomena in space is represented as due not specially to the subject as opposed to the object, but to the activity of a principle identical in the subject and the object (Fichte, *Werke*, i. 190; cf. 343, viii. 415; Schelling, *Werke*, i. 3, 22 ff.; Hegel, *Werke*, vii. 44 ff.; *Logik*, i. 279, iii. 353; *Encyc.*, § 244). The realistic Herbart, with the principle, 'wie viel Schein, so viel Hindeutung auf Sein,' opposes to phenomenal an 'intelligible' space (*Met.*, ii. 200 ff.), as denoting the fact of a real order of coexistence in the multiplicity of elements posited as absolutely real, although, as Trendelenburg justly observes (*Log. Untersuch.*, i. 190), the latter is modelled entirely on the former. Trendelenburg himself holds that space is not the presupposition, but the product, of motion (ibid., 215 ff.). Other systems tend to a revival of the view of space implied in the Leibnitzian spiritualism (Lotze: 'every particular feature of our spatial intuition corresponds to a ground in the world of things,' *Met.*, § 113. Wundt: objective space, after elimination of subjective elements, is 'the regular order of a manifold consisting of particular independently given real objects,' *Logik*, i. 463). Among original thinkers of the first rank, Schopenhauer alone accepts the Kantian doctrine without reserve. Amid this conflict of opinion, the Kantian criticism and the whole subjective trend of modern philosophy seems to have made one thing clear, and that is that space is a category which has neither meaning nor validity beyond the bounds of possible experience. If, therefore, we refuse to accept the naïve conception that the object is one thing and its idea in the mind a mere counterpart and copy, we must admit that there are not two spaces, one real for things and one ideal for minds, but that ideal space is only the abstraction of real space, and real space only the realization of the ideal. Whatever reality, therefore, and whatever ideality belong to objects in space belong to space also. Hence everything depends on the interpretation of experience. Cf. SPACE-PERCEPTION, and EXTENSION. (H.N.G.)

Literature: besides the citations made above, see BIBLIOG. B, 2, *j*, and G, 2, *v*; see also EXTENSION, and the numerous quotations in EISLER, Wörterb. d. philos. Begriffe, 'Raum.' (J.M.B.)

Space (in mathematics). The totality of all the positions into which a body could possibly be moved, were no impediment to motion in existence.

This totality forms a continuum (see CONTINUITY, in mathematics), the conception of which is so elementary and fundamental that no definition can materially aid in its formation. For us the parts of space are all those places, infinite in number, to which or in which a body can be conceived to move or exist, and, vice versa, we can conceive any body to move into a part of the infinite continuum which is formed by the totality of those places. Space is continuous not only in the sense that every part joins to the parts around it, but that every part is susceptible of indefinite subdivision.

Our fundamental conception of space assigns to it these properties:—

(1) It is the same for all bodies. Wherever one body could move, thither could any other body move.

(2) It is triply infinite. A point may move independently in three independent directions, all perpendicular to one another, called dimensions, to an infinite distance.

(3) It has no qualities or *differentia* dependent either on position or direction. Wherever a body may be situated, its capacity of movement is the same for all positions and for all directions.

(4) It is homoloidal. Two parallel straight lines may be produced indefinitely without either converging towards or diverging from each other.

On these properties is based the science of geometry. Mathematicians have, however,

posited spaces in which the second and fourth properties are modified in various ways. Such hypothetical space is called *hyperspace*. The principal forms of hyperspace are these:—

(1) *Space more than triply infinite*, or, in familiar language, having more than three dimensions. In such a space four or more lines, each perpendicular to all the others, could pass through a point. Of course this is inconceivable, but quite self-consistent.

(2) *Curved or non-homoloidal space*, which may be *elliptic* or *hyperbolic*:

(*a*) *Elliptic space*: that in which two parallel straight lines intersect when produced to a certain distance.

(*b*) *Hyperbolic space*: that in which two such lines diverge from each other. (S.N.)

Space-perception: Ger. *Raumwahrnehmung*; Fr. *perception de l'espace*; Ital. *percezione di spazio*. Cognition of extension so far as it does not involve conceptual process. 'Cognition of space' is a better term than 'space-perception.' See EXTENSION, and cf. SPACE.

Properly speaking, there is no perception of space considered as an individual unity boundless in extent and comprehending within it all the places and distances of the contents of the physical universe. This is a concept, not a percept. The same is true of the space of the Euclidean geometry and of the various kinds of space treated of in metageometry. (G.F.S., J.M.B.)

Many experiments have been performed upon various aspects of the problem, particularly the cognition of visual and tactual extent. See DEPTH (visual perception of), and INDIRECT VISION; and cf. STATIC SENSE, EQUILIBRIUM, ILLUSIONS OF MOTION, I, and LABORATORY AND APPARATUS, III, B, (*a*), (*c*). Pathological cases, of impaired or undeveloped cognition (notably cases of restoration to sight of those born blind), are also instructive.

Literature: see EXTENSION (and other topics cited); also BIBLIOG. G, 2, *v*. (J.M.B.)

Space Sense: see EXTENSION, and SPACE; and cf. SENSATION AND SENSE (2).

Spacialization: Ger. *Raumlokalisation*; Fr. *spacialisation*; Ital. *spazializzazione*. Suggested for the external LOCALIZATION (q. v.) in space which is contrasted under that topic with the reference of a stimulation to a position on the periphery of the body. The term localization would then be restricted to this latter. (The French and Italian equivalents are also suggested—with approval of TH F. and E.M.) (C.L.F.–J.M.B.)

Span of Consciousness: see FIELD OF CONSCIOUSNESS.

Spasm [Gr. σπασμός, cramp]: Ger. *Spasmus, spastischer Krampf*; Fr. *spasme*; Ital. *spasmo*. A convulsive, involuntary contraction of a muscle or set of muscles. A tonic spasm causes a more or less persistent contraction of the muscle, while if the contraction is intermittent it is termed clonic; the former are termed cramps, the latter convulsions.

Facial spasm ('tic convulsif') is due to lesions in the cortex or root-nucleus of the facial nerve, or in the fibres of the nerve itself. Spasmus nictitans or spasmodic blinking and blepharo-spasm affect the eyelids and face adjacent. Bronchial spasm is apparently a vagus neurosis. Spasms of other muscles occur as symptoms of a large range of nervous diseases.

Hemispasm is an epileptiform seizure confined to one side of the body.

Monospasm is a convulsive contraction of a single group of muscles resulting probably from a focal point of irritation in the central nervous system.

As examples of spasms may be mentioned the spasm of the pharynx in hydrophobia, of the diaphragm in hiccup, the various convulsionsof an epileptic seizure, the paroxysms of hysteria, the inco-ordinated movements of chorea, tremors, and the like. See EPILEPSY, HYSTERIA, TREMOR, MOVEMENT (disorders of), and ATAXIA. (H.H.–J.J.)

Special Creation Theory or **Creationism** (q. v. for foreign equivalents). The theory that biological species were created each 'after its kind' by a direct act of God, and not by a process of evolution or genetic DESCENT (q. v., doctrine of). (J.M.B., E.B.P.)

Special Terms (in logic): see SYMBOLIC LOGIC, ad fin.

Species (in biology) [Lat. *species*, kind]: Ger. *Art*; Fr. *espèce*; Ital. *specie*. A group of genetically related individuals, presenting fairly constant and distinctive heredity, and sufficiently alike to be included under one name. The adjective specific—belonging to a species—occurs in phrases such as specific characters, interspecific sterility, &c.

The conception of 'species' has been so revolutionized since the publication of Darwin's famous book on their origin, that it now bears little resemblance to the ideas about species prevalent before 1859. It is, indeed, scarcely possible in a few words to give a satisfactory definition of what is now

meant by the word species, since it involves our whole conception of the process of organic evolution. Whilst species were formerly held to be of fixed, if slightly modifiable, character, to be incapable of fertile intercrossing, and to have been separately created, they are now considered to have been evolved from pre-existing species by gradual modification, to have no absolutely fixed character, and to be by no means always sterile when crossed with each other. Organisms need not necessarily be alike to be of the same species; as, for instance, in the case of the alternation of unlike generations, or of sexual differences. Similarity (of the individuals of one sex) at some stage of their life-history, and 'blood relationship,' are the only essential common characters of the individuals of a species. Each of the characters of the individuals of a species may vary about a mean, no two individuals being exactly alike. The specific characters of an assemblage of individuals (species) are those which are most developed in the largest number of individuals. By these the species may be defined. (E.S.G.)

Linnaeus defined species in terms of creation: 'Species tot sunt diversae, quot diversae formae ab initio sunt creatae.' Cuvier accepted and widely promulgated this orthodox doctrine. Buffon and Lamarck contended for the transmutation of species, whereby the accepted dogma was rendered nugatory. The number of German species of hawkweed, according to one botanist, is some 300, according to another less than twenty. The term 'species' was introduced by Ray, and the binomial system of nomenclature now universally adopted is due to Linnaeus. See CLASSIFICATION (in biology), VARIETY, VARIATION, HEREDITY, and EVOLUTION.

Literature: LINNAEUS, Philosophia Botanica; DARWIN, Origin of Species; KERNER, Gute u. schlechte Arten; ROMANES, Darwin and after Darwin, ii; A. R. WALLACE, Darwinism; K. PEARSON, Grammar of Sci. (2nd ed., 1900). (C.LL.M., E.S.G.)

Species (and **Specific Marks,** in logic). A relatively narrow class and the marks which belong to it. See LATIN AND SCHOLASTIC TERMINOLOGY, 4, 14, and cf. DEFINITION. (C.S.P.–J.M.B.)

Species considered as disjunctively co-ordinated under a genus are called 'disjunct.' See DISJUNCTIVE. (J.M.B.)

Specific: see SPECIES (in biology, and in logic).

Specific Energy of Nerves: Ger. *specifische Sinnesenergie, specifische Energie der Nerven*; Fr. *énergie spécifique des nerfs*; Ital. *energia specifica dei nervi.* (1) The theory that each sensory nerve and nerve-fibre, in whatever manner stimulated, gives rise in consciousness to a specific sensation, different from that produced by stimulation of any other. 'This function of the individual nerves, determined by their anatomical connections, is called their "specific energy"' (Landois and Stirling, *Human Physiol.*, 1891, 714). (E.B.T.)

(2) Specific energy, it is now thought, depends on the end-organ, together with (especially) the central connections in the cerebral cortex.

The doctrine of specific energy of nerves was enunciated by E. H. Weber, and especially elaborated by Johannes Müller (*Physiol.*, ii. 250, 1840). The doctrine in the form (2) can be easily demonstrated with the sensory nerves of sight, hearing, and touch, including temperature and possibly pain. Taste and smell present extreme mechanical difficulties to experimental demonstration of the law. Oehrwall's recent experiments on taste (*Skand. Arch. f. Physiol.*, 1890, ii. 1) point strongly to its application to this sense. (C.F.H.)

Literature: a full discussion is given by WUNDT, Physiol. Psychol. (4th ed.), i. 285, 323–32; EBBINGHAUS, Psychol., 144 ff., and references; LEWES, Physiol. of Common Life (1860), chap. viii; and Problems of Life and Mind, i. 135 (1874); HORWICZ, Psychol. Analyse (1872), i. 108. (E.B.T.)

Specific Gravity: Ger. *specifische Schwere* (or *Gewicht*), *Dichtigkeit*; Fr. *poids* (or *gravité*) *spécifique*; Ital. *gravità specifica.* The ratio of the weight of a body to the weight of an equal volume of water; now replaced by the word DENSITY (q. v.). (S.N.)

Specification [Lat. *species*, kind]: Ger. *Spezification* (Fries); Fr. *spécification*; Ital. *specificazione.* The act of making specific (1) by a new determination of a mental content or object, or (2) by the determination of a notion in a less general class or in an individual.

The first meaning is useful in connection with the growth and successive modifications of a mental content, each reappearance of the content being a new specification of it. This usage is due to Stout. Cf. DETERMINATION. The second is the more popular, and the meaning in logic. (J.M.B., G.F.S.)

Spectator: see PRODUCTION, and PRODUCER.

Spectre [Lat. *spectrum*, a vision]: Ger. *Gespenst*; Fr. *spectre*; Ital. *spettro*. A ghostly apparition.

As a factor in popular belief (folk-lore), spectres play an important part and are conceived as disembodied human spirits revisiting the scenes of their former existence, with kindly or malicious motives, or as impelled by some mysterious necessity. At times they are represented as speaking, more usually as indicating their wishes by gestures. See PHANTASM, and HALLUCINATIONS, and cf. TELEPATHY. (J.J.)

Spectro-photometry: see PHOTOMETRY.

Spectroscope: see LABORATORY AND APPARATUS, III, B, (*a*), (3).

Spectrum: Ger. *Spectrum*; Fr. *spectre*; Ital. *spettro*. The band of prismatic colours, or isolated bands of colour, observed when the radiation from a source of light (sun, arc light, ignited vapour in a gas flame, &c.) is passed through a prism or reflected from a diffraction grating. See COLOUR MIXTURE, COLOUR-BLINDNESS, and FRAUNHOFER LINES. (E.B.T.)

The 'emission' spectrum of a source radiating trains of waves of different periods is the name given the collection of waves when separated into trains, each of a definite period, in such a manner that each train is proceeding in a direction different from that of the others. If the radiation from a body emitting waves of all possible periods is allowed to fall upon a substance, part will in general be transmitted or reflected, and part absorbed. If the transmitted and reflected radiation is dispersed in the above manner, the name 'absorption' spectrum is applied to the trains of waves which are not transmitted or reflected; that is, to the radiation which is absorbed.

Spectrum analysis is the study of both the methods for the production of spectra and the results of the comparison of emission as well as absorption spectra.

Spectra are produced by prisms and gratings owing to the dispersion of waves of different periods; and the radiation is detected by various means—photographic, instrumental, visual, &c.—depending upon the period of the waves. It is found that solids emit continuous spectra, i. e. there are present in their radiation waves of all periods between certain limits; that gases when luminescent emit discontinuous spectra, i. e. there are present in their radiation only isolated trains of waves, thus giving bright 'lines'; that at any definite temperature the emission and absorption spectra of any substance are identical in all respects, provided that the state of the body is dependent on its temperature alone, not on electrical or other conditions.

Literature: H. KAYSER, Spectralanalyse, in Winkelmann's Handb. d. Physik, ii. 1; LANDAUER, Spectral Analysis (Eng. trans.).

(J.S.A., C.L.F.)

Speculation [Lat. *speculari*, to view, contemplate]: Ger. *Spekulation*; Fr. *spéculation*; Ital. *speculazione*. (1) Meditation or reflection of the mind upon itself, or upon spiritual things.

The Greek *θεωρία* meant direct intuition (Schauen) of transcendent, which is not discursive; thus opposed to dialectic. (J.D.–K.G.)

(2) A form of theorizing which goes beyond verifiable observation and reflection, characterized by loose and venturesome hypotheses (popular use).

(3) The conclusion and completion of the movement of thought which apprehends the unity of categories in and through their opposition. It has this last and technical sense in the Hegelian philosophy. The understanding lays down propositions in an uncritical and dogmatic form; unaware of any relation between its propositions, it asserts each as ultimate in its isolation. The negative reason, or dialectic, reveals the essential self-contradiction and self-transcendence, the fluidity of all these fixed concepts. When made ultimate it leads to scepticism; but when used as a factor in developing a more comprehensive point of view and a conception from and within which both the previous isolated notions and their opposition can be explained, it passes into speculative reason. This, like the understanding, is positive, but it is a positive which manifests itself through a process of development, instead of being assumed as fixed (Hegel, *Logic*, § 82). See UNDERSTANDING, and REASON. Cf. Eisler, *Wörterb. d. philos. Begriffe*, 'Speculation,' for citations, meanings (1) and (3). (J.D.)

Speculation (commercial). The attempt to make money by foreseeing changes in the price of goods and securities; buying them, or the means of producing them, when they are cheap; selling them, or selling rights to have them delivered, when they are dear.

When the speculator really foresees the movements of the market he renders great public service. By withdrawing goods from the market when they are overabundant he

prevents waste; by placing them on the market when they are scarce he prevents famine. His personal profit represents but a small fraction of the gain to society. Similarly in the case of the speculator who buys labour, and sells the products of that labour.

If the speculator does not foresee the movements of the market, but takes random chances of gain or loss, speculation is pure gambling; and if he attempts to manipulate demand instead of anticipating it, the case is still worse. (A.T.H.)

A form of stock-gambling, which is also called speculation, is dealing in 'margins': the buying and selling of goods beyond the buyer's power to pay, without demanding the actual delivery of the goods (which indeed may not exist—as in the case of unripe crops), and with the expectation of selling the purchase at a higher price before the demand for payment is made. The profit is the 'margin' between the buying and the selling price. (J.M.B., A.T.H.)

Literature: HADLEY, Economics, chap. iv; see ECONOMIC SCIENCE. (A.T.H.)

Speech (and **its Defects**) [AS. *spæcan*]: Ger. (*die verbale*) *Sprache*; Fr. (*la*) *parole*; Ital. (*la*) *parola*. That exercise of the LANGUAGE FUNCTION (q. v.) which employs the VOCAL ORGANS (q. v. for their anatomy and physiology). (J.M.B.)

I. *The factors of speech.* The processes concerned in normal speech are primarily of three types: (*A*) sensory, (*B*) motor, (*C*) intellectual or (mainly) associational.

(*A*) Speech involves the use of a sensory organ, by the stimulation of which an impression is carried to the mind of the person addressed. Normally, the eye and the ear are the senses thus used, but in blind deaf-mutes touch becomes the sole receptive speech process; while in the deaf the eye becomes the medium of other speech types than the usual ones of reading printed or written characters. The other senses do not present the easily recognizable variety of impressions, nor does our motor endowment contain the means of rapidly producing impressions capable of affecting them, both of which are requisite for a convenient mode of expression. While the mere existence of speech is conditioned upon the possibility of some form of sensory or receptive function, it involves as well a second element of interpretation: only when the sense impression which has first been seen or heard is interpreted, does it represent a complete receptive factor of speech. We hear the sounds of a strange language, we see the printed characters of a Chinese book; but these sensory processes are not speech processes until we interpret what is spoken or written.

(*B*) On the motor or expressive side speech again involves a double process: (1) the ability to contract in regular co-ordination certain groups of muscles, for (2) the production of significant sounds.

[The nerve-fibre bundles pass down in the internal capsule from Broca's centre to nuclei of origin in the medulla and spinal cord for the motor nerves of the tongue, larynx, jaws, and lips, and muscles of respiration. (C.F.H.)]

The selection of the movements available for speech was determined by utility, i. e. variety, quickness and ease of production, and especially the readiness with which the resulting changes of position (articulation) may be perceived and distinguished, although these utilities are not consciously subserved in the evolution of speech. Among motor mechanisms the lips, tongue, and vocal cords are pre-eminent. In contrast with movements addressed to the eye, as in sign language, these are more fundamental and natural; they are always available by day and night, and whether the communicants are within sight of one another or not; the mechanism is capable of producing an endless variety of sounds, with which the analytic power of the ear keeps pace; and sounds pass readily from an immediate natural to an indirect symbolical meaning. The correlation with a sensory function, which guides and directs the results of muscular co-ordinations, is of fundamental importance alike for the comprehension of the nature and growth of normal speech and for that of speech defects.

(*C*) The importance of the associative factors arises primarily from the interpretative element in both receptive and expressive speech processes; but it acquires additional complication from the existence of several forms of the language function—reading and understanding, speaking, and writing—and the consequent association of each with the others. We may write by dictation what is addressed to the ear, or read aloud from the page as well as repeat vocally what we hear, or reproduce manually a set copy. These processes proceed respectively from ear to hand, from eye to voice, from ear to voice, and from eye to hand. The latter pair are

relatively simple, and form an important factor in learning to speak and write; the former pair represent facilities which almost inevitably result from the associations built up in the acquisition of the four fundamental speech processes, but none the less represent additional association groups. Still further complications arise when the speech processes are carried on in several languages, with various degrees of fluency, i. e. of intimacy of association, between the sensory and motor processes involved.

The specific nature of these associations must be carefully noted. In the receptive processes it is the centring of a cluster of memory-images or dispositions about a particular sound addressed to the ear, or a combination of characters addressed to the eye; these may vary indefinitely in character, but they retain a sufficient nucleus of similarity in different individuals, and from time to time, to serve as a basis of connection between word and the object or idea named. The same idea may be aroused by hearing the word 'blue' spoken, by seeing it in print, or again, to one acquainted with German or French, by hearing or reading 'blau' or 'bleu'; and also by seeing the blue sky or a blue flag. That associations of a useful and complicated kind may occur without the medium of speech can hardly be doubted; and the existence of such non-verbal associations is significant in the analysis of speech defects. On the motor side the association is that between the idea and the motor images or dispositions accompanying the production of the sound in speaking, or of the manual movements in writing. These kinaesthetic associations are more difficult to realize independently; for the execution follows immediately upon the innervation, and the innervation upon the intention to speak. And yet movements here as elsewhere are guided by complicated sensations of position and contraction, in the absence of which the bond between the intention to speak, accompanied by a clear knowledge of what one wishes to say, and the placing of the vocal organs in the proper position to say it, is broken, and that without any paralysis or other impairment of the muscles involved. We remember how to speak, just as we remember how to walk, or to skate, or to perform an act of skill; when we forget these the proper association of sensory with motor elements fails. We may realize what we wish to do and what the result would be if accomplished, but fail to set the muscular co-ordinations accurately enough to produce what is intended.

Together with the other language functions the speech processes may be conveniently presented in the following arrangement:—

Lang. Func.	Receptive.	Expressive.
Primary	Understanding (by the ear) [1]	Speaking
Secondary	Intelligent Reading	Writing

In this scheme the following relations are important: (1) each expressive function depends upon and is closely related to a receptive function. The ear and the voice, the eye and the hand operate together. In this combination the receptive is earlier and conditions the expressive. The child learns to understand before he learns to speak, and he normally learns to speak because and so far as he learns to understand. Nature furnishes a convincing illustration of this genetic relation in the fact that deafness leads to dumbness (cf. Deaf-mutism). The higher animals acquire considerable facility in interpreting our speech sounds, but they do not speak. One may learn to read without knowing how to write, but one cannot normally learn to write without being able to read, i. e. to recognize and interpret what one writes. (2) The receptive functions cover a wider scope than the expressive ones. We understand many more words than we use; we recognize faults in pronunciation which we cannot correct, and so on. (3) The ear-voice mechanism is an earlier and simpler development than the eye-hand mechanism. All children by simple imitation learn to understand and speak, but it requires a special and somewhat elaborate training to acquire reading, and, in obedience to the former principles, a still more protracted training to learn to write.

The relations thus noted condition the extent and nature of the associations which for each individual represent his language functions. Whether impairment of one association group will bring with it impairment of another will depend upon the relative independence of organization of the two; such independence being a factor of the inherent relations between the language processes and also

[1] While three of these processes have received distinctive names, the most fundamental of all, by its very obviousness, has failed to be described by any other word than that which refers to the interpretation of a form of sense impression.

of individual training. A man of culture and large literary training may read and write as easily and as fluently as he understands and speaks, and with no reference to spoken language; but for a poorly educated person reading is a distinct translation into auditory symbols, while writing is hardly more than drawing; and such differences will be reflected in speech defects. Along with these differences should also be noted the varying prominence which visual and auditory and muscular processes occupy in different minds—eye-mindedness, ear-mindedness, motor-mindedness, &c. Cf. TYPE (mental).

It is also to be noted that the language processes in which there is no outward expression, or only a very suppressed expression, are significant in the conception of the factors involved. The name INTERNAL SPEECH (q. v.) is given to these, and they consist of reading to oneself and in formulating words for speech or thinking in verbal terms. Such processes are often but vaguely realized, and evade close examination, but their integrity is essential to a complete speech development, and their preservation in speech defects is often significant.

II. *Disorders of speech.* The complete act of speaking involves (*a*) the capacity to think or formulate ideas; (*b*) the ability to recall and construct the words which express the ideas; and (*c*) the actual articulation of conventional sounds. Receptive speech involves an impressibility of the ear or eye, a recognition of the particular sounds or symbols used, and an intelligence and training sufficient to appreciate their significance. If there is a defect in hearing or seeing, it may modify or interfere with normal speech processes, but it does so only secondarily, such defects being primarily of the ear and eye. If there is a defect in articulation due to partial paralysis or faulty structure of portions of the vocal mechanism, such defect interferes with perfect speech, but is not a true aphasia or disorder of speech, but a disorder of articulation. Again, any disorder of the intellect which makes speech impossible or incoherent is primarily mental and not specifically aphasic; the defective speech, or inability to speak, of an idiot or of a demented person is a part of his general mental deficiency. There are, however, certain nervous difficulties which affect speech, and certain faults of articulation, some of them of a composite character, which it is customary to consider in connection with true disorders of speech. We may thus (following Séglas) distinguish (*a*) the *dyslogias* or disorders of intelligence which affect speech, (*b*) the *dysphasias* or true disorders of speech, and (*c*) the *dyslalias* or *dysarthrias*, i. e. difficulties of articulation.

[These three types of defect correspond to the three 'levels' of nervous process usually distinguished as 'first,' 'second,' and 'third' level. The lowest, or third, is purely sensori-motor, but its impairment may be sensory or central as well as purely articulatory—as is seen in verbal AMIMIA (q. v.) of central origin. (J.M.B.)]

(*a*) *Dyslogia.* There is a form of defect in children in which, without deafness and without paralysis, speech fails to appear; this is sometimes termed congenital aphasia. There is usually a good understanding for words, but the impulse to speak or the power to develop the motor speech centre is abnormally weak. Such cases often develop speech very late, and may retain marked articulatory defects. Apart from dementia and idiocy and general mental disorganization, there are several functional disorders characterized by absence of speech or defective speech which are partly of mental origin; these will be considered under functional aphasia. Cf. ALOGIA, APHASIA, CATAPHASIA, ECHOLALIA.

(*b*) *Dysphasia* is more commonly termed aphasia in the general sense of impairment of some one or more of the factors of speech, not due to intellectual defect nor to defect of the articulation or externalization of words. Such defects form the main subject of this article. Cf. APHASIA.

(*c*) *Dyslalia* or *dysarthria*, or defects in articulation, are of various kinds and affect different portions of the composite result. As the result of articulation is guided and corrected by the ear, any serious defect in hearing will affect articulation. The clearest example of this appears in the mutism that results from congenital or early deafness (cf. DEAF-MUTISM), and also in the faulty articulation and modulation of deaf persons who have been taught to speak by the guidance of kinaesthetic muscle sensations alone. Of defects of articulation due to specific motor disorders may be mentioned STUTTERING (q. v.), LALLING (q. v.), the characteristic defects of young children, APHONIA (q. v.) or difficulty in voicing the articulation, and various forms of special difficulties in connection with specific letters and sounds (cf. ANARTHRIA). See also AMIMIA.

III. *Aphasia: History.* The modern study

of aphasia—understood to comprise defects of the language functions as a whole, not merely verbal speech—began in 1861 with the memoir of Broca, which located the seat of the disorder in the third frontal convolution of the left hemisphere. There were earlier and disconnected attempts to study the pathology of speech by Bouilland (1825), Jackson (1829), Dax (1836), Lordat (1843); the speculations of Gall (died 1828) and others were also influential. To the motor aphasia of Broca (also termed aphemia), the conception of sensory aphasia was added by Wernicke in 1874; and the first comprehensive work on disorders of speech was that by Kussmaul (1877), in which the terms word-deafness, word-blindness, and other distinctions were first introduced. Following this came the remarkable researches of Charcot and his school. Since then the literature of aphasia has grown to unusual proportions, and a great variety of interpretations and classifications of aphasic defects has been introduced. Hypothetical diagrams to illustrate the relations of speech centres and their connections have been extensively employed by Wyllie, Elder, Lichtheim, Bernard, and Baldwin. Amongst the recent contributions have been the differentiation of cortical and subcortical aphasia, the controversies in regard to the existence and nature of transcortical or associational aphasia, in regard to the existence of a separate graphic centre, and in regard to the precise cortical localization of the auditory, visual, and motor speech areas. In the following exposition an attempt will be made to present the results which command general assent. (On the history see especially Collins, chap. ii, and Elder, Introduction, both as cited below.)

IV. *Classification and Analyses.* As aphasia appears as a symptom in various disorders, it becomes of the first importance to differentiate aphasic symptoms. The first step is readily taken by noting whether the defect consists in the impairment of the power to speak, to comprehend spoken language, to read, or to write. But this external distinction must be supplemented by a determination of the cause of the symptom. Such cause may be expressed in anatomical terms as due to the injury of a certain portion of the brain, or in psychological terms as due to the interference with the function of some one of the processes involved in speech. In the present state of knowledge it is necessary to supplement each of these sources by constant reference to the other; and both must be interpreted in accordance with the facts of the normal development of speech. The distinction between motor and sensory aphasia is a fundamental one; the further division of these disorders is discussed below. Anatomically, aphasias may be classed as cortical when there is a lesion in the speech centres; as subcortical when there is a lesion in the lower centres or their connections; and as transcortical when there is a lesion in some of the associational fibre systems connecting cortical speech centres with one another. Such a classification is dependent upon clinical experience; it assumes a knowledge of what centres are involved in speech, their location, and that of the fibre-systems connecting them. While the knowledge thus required is only partially available, the definiteness of the resulting conception of aphasic disorders renders it a most serviceable classification.

[Transcortical, cortical, and subcortical correspond in order to dyslogia, dysphasia, and dyslalia, as given above. 'Cortical' is often used, however, to cover all cases except the 'subcortical.' (J.M.B.)]

The speech centres. The fundamental association of defects of speech is with lesions in the left hemisphere. The general sensory and motor areas of which the speech centres present specialized functions are present in both hemispheres, and it is with reference to these that the speech centres must be interpreted. There is thus a general centre for the visual interpretation of objects (occipital lobe, probably including internal surface near calcarine fissure); a special centre for the interpretation of words as read (that part of the inferior parietal convolution known as the angular gyrus); a general auditory centre for the interpretation of sounds (first and second temporal convolutions); a special centre for the understanding of spoken words (middle portion of first temporal convolution); a general psychomotor area for the expression of thought by movement (the Rolandic region, ascending frontal and ascending parietal convolutions); a special motor or kinaesthetic-motor speech centre (Broca's convolution, foot of the third frontal convolution); finally, a centre for the direction of hand-movements (a portion of the middle Rolandic area) and (admitted by some but denied by others) a special graphic centre (for writing, foot of second frontal convolution). See Fig. 1.

[The entire Rolandic region, called above the 'general psychomotor area,' is by many, following Bastian, held to be the centre for kinaesthetic sensations and ideas, the true motor or 'discharge' centres being considered subcortical. (J.M.B.)]

The location of the special speech centres in the left hemisphere is connected with the prevalence of right-handedness. In left-handed persons these centres are situated in the right hemisphere. The left hemisphere is regarded as containing the centres for the more highly specialized functions; among them, manual dexterity and articulation. The

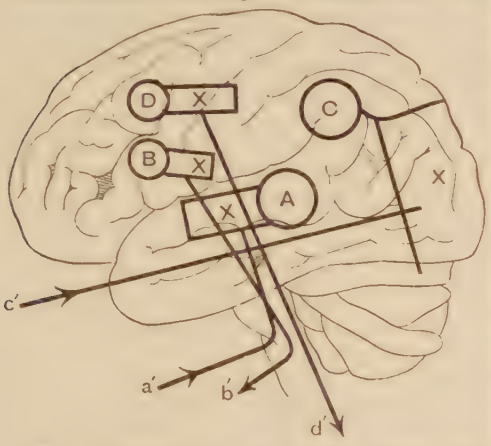


Fig. 1. Diagram of speech centres (Elder). The circles indicate higher speech centres; the crosses indicate the higher auditory and visual sensory centres and the motor areas most closely connected with the movements involved in speech. *A*, auditory centre; *B*, psychomotor speech centre; *C*, visual centre; *D*, supposed psychomotor graphic centre; *a'*, auditory nerve; *b'*, nerve-fibres to muscles concerned in articulation; *c'*, optic nerves; *d'*, nerve-fibres to hand. [For other diagrams representing different views as to the exact localizations, the most recent literature should be consulted.—J.M.B.]

cortical centres for sight and hearing are concerned only with the interpretation of optical and auditory impressions, and their destruction produces neither blindness nor deafness (which are due to lesions in the subcortical centres or in the connections of the latter with their sense-organs), but a peculiar defect known as Mental Blindness (q. v.) and Mental Deafness (q. v.), in which, with vision and hearing intact, the sight or sound conveys no meaning. Word-blindness and word-deafness are similar but more limited defects of the visual and auditory word-centres (see below). A differentiation in regard to the motor centres is less clear. By some the motor speech centre is regarded as specifically motor, i. e. as serving for the emission of the movements of articulation; while by others its function is regarded as more truly sensory (kinaesthetic), i. e. a centre for the storing of the sensations and images accompanying and guiding articulation. Both this and the supposed graphic centre form portions of the general motor area, the functions of which are subdivided into specialized regions in control of the movements of the hand, of the lips and tongue, &c. These several centres must not be considered as independent or autonomous; their intimate relations to one another must be clearly realized, and particularly the close association of all in vocalized speech. The special relation which obtains between hearing and speaking—and again between writing and reading—is of co-ordinate importance (cf. Figs. 2, 3, 4).

V. *Motor Aphasia.* (*a*) *Cortical*: the fundamental symptom is lesion in Broca's convolution; aphasia due to inability to articulate. This is not the result of any paralysis (although with a lesion in this area, owing to its proximity to the motor centres, some degree of paresis, hemiplegia, is frequently present), but is best interpreted as due to the loss of the kinaesthetic motor images which direct articulation. Along with this loss there is a loss of all speech processes which require the integrity of these kinaesthetic memories. Hence the motor aphasic is often unable to repeat words which he hears and understands, and is unable to read aloud the words which his eyes see. [He may, however, retain the purely imitative performance of both functions.—J.M.B.]

Moreover he is unable to write, because as a rule in writing there precedes and accompanies the actual manual execution certain articulatory images following upon the visual images of the letters formed, or, in case of writing from dictation, of the sounds heard (see Figs. 3 and 4). Even the power of understanding written and printed characters is likely to be interfered with because and in so far as these visual symbols achieve their interpretation by arousing, though inaudibly, the corresponding utterances. In brief, the analysis of speech factors (see above) indicates the two primary factors to be understanding of spoken words and their articulation, on the basis of directive kinaesthetic sensations. When the latter capacity is lost the former remains unaffected, but the secondary speech processes are affected in so far as they are dependent upon the directive sensations just

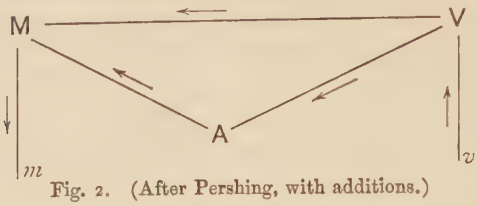


Fig. 2. (After Pershing, with additions.)

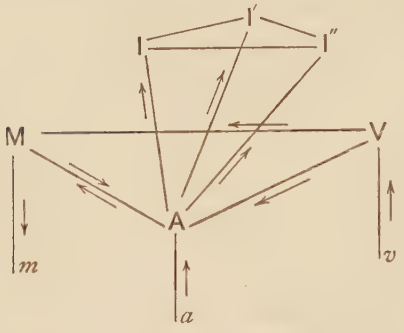


Fig. 3. (After Pershing, with additions.)

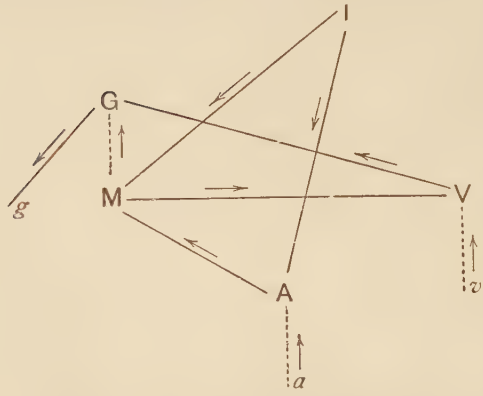


Fig. 4. (After Pershing, with additions.)

In Figs. 2, 3, 4, the arrows show direction of impulses; *M* is the motor, *A* the auditory, *V* the visual speech centre; *I*, *I′*, *I″*, the ideational centres; *G*, the graphic centre; *a* indicates fibres from the ear to the auditory centre, *v* from the eye to the visual centre, *m* fibres to the organs of articulation, and *g* to the hand. Fig. 2 represents the utterance of a word corresponding to a visual idea; the impression reaches the visual centre, and from there, directly and by way of the auditory centre, the motor centre is incited to send out articulatory impulses. Fig. 3 illustrates reading aloud with understanding of what is said. The visual impressions reach the centre *V*; and the reader hears what he reads by way of the ear and the auditory centre; both centres are connected with the centres *I*, *I′*, *I″*, by means of which comprehension takes place; the constant direction of articulation in accordance with what is seen is also important. In silent reading the tracts *M m* and *a A* are not used, but the auditory centre is reinforced by the reflex impulses *M A*. Fig. 4 illustrates the process of writing. The centres for ideas *I* (represented as single for the sake of simplicity) send impulses to *A* and to *M*, reviving memory of sound and utterance; *A* sends impulses to *M*, ensuring correct memory of utterance; *M* sends empulses to *V*, recalling the appearance of the words, and *V* to *G*, recalling memory of the hand movements. *G*, *g*, the outgoing impulses to the hand; *M G*, short cut for words written automatically when *V* and its connecting tracts are not used. In writing from copy the impressions enter directly at the centre *V*, and in writing to dictation at the centre *A*.

[Most of the diagrams, of which these may be taken as examples, are variations upon those of Lichtheim (work cited below).—J.M.B.]

mentioned. The determination of these directive sensations, and of their loss in cortical motor aphasia, thus becomes of great importance. The best test is the integrity of Internal Speech (q.v.), of thinking in words. According to the analysis here followed, this power should be completely lost in complete cortical motor aphasia, and because of its loss the patient cannot speak, and concomitantly cannot write or even read. If he retained the internal motor images of spoken words, he should be able to indicate, e. g. by holding up the proper number of fingers, the number of syllables contained in a word which he understands when he hears it but cannot pronounce; this test (known as the Proust-Lichtheim test) in cases of true cortical motor aphasia cannot be met. Many writers regard this inability as the distinctive criterion of cortical motor aphasia, and the ability to meet this test as indicative of subcortical motor aphasia.

[This test should, however, be followed by the imitation test, the patient being instructed to repeat exactly questions addressed to him. The retention of this power shows the lesion to be restricted to the cortical area. This test is suggested by the fact that patients of this sort often spontaneously repeat questions addressed to them instead of answering them. (J.M.B.)]

It happens not infrequently that the motor aphasic retains the power of saying a few words or phrases of a reflex or of an emotional type. These he uses repeatedly and often inappropriately. He may say 'yes' or 'no,' 'good-morning' or 'how are you?' or utter meaningless sound or a conventional oath. This may be regarded as an indication that the cortical centre is not completely destroyed, or may be interpreted as a purely emotional expression, the use of which, like scowling or making a fist, this class of aphasics retain. In regard to writing, the

ability to sign one's name is oftenest retained, and this because the signature, unlike words in general, is a mere bit of manual execution, and does not tend to be mentally pronounced as do other written words. But the capacity to write from copy is present, and such copying is done in obedience to the established habit; print as well as script is copied as script. The copying process thus does not involve the kinaesthetic articulatory memories; it is called into action sufficiently by the visual stimuli [being a purely imitative sensori-motor process—J.M.B.].

It is, moreover, to be noted also that this form of cortical aphasia is often accompanied by a dyslexia (or difficulty in reading), which may be indicative of a partial involvement of the visual word-centres; and this condition when present will likewise affect the power to write. While the mental faculties are not obviously impaired, there is an indisposition to mental application; there may be a considerable amnesia and a diminished grasp of facts communicated during the aphasic condition. In recovery, or partial recovery from complete cortical motor aphasia, interesting symptoms are often observed; of these, paraphasia, or the wrong use of words, is characteristic. The most absurd substitutions of unrelated words may occur ('kittens' for 'stockings,' 'chickens' for 'sponge,' &c.); and the result of reading aloud is a confused mixture of correct and irrelevant words (see Collins, as cited below, 185 ff.). There are many other symptoms of this form of aphasia which are of variable occurrence and of doubtful interpretation, and which require the detailed description afforded them in medical literature.

(*b*) *Subcortical motor aphasia* is dependent upon a lesion in the fibre-system that leads from Broca's convolution to the subcortical centres and ganglia. Its characteristic is the inability to externalize speech, along with the integrity of the power to form words properly as a factor of internal language. The symptoms of this type of aphasia closely approximate to those of the cortical type; and until recent exact differentiations were introduced, the two forms were doubtless frequently confused. The main differentia are the retention of the ability to write, and the retention of the idea of the word (Proust-Lichtheim test as above described), both of which point to an integrity of the kinaesthetic memory images. In typical cases none of the other speech factors is affected, but the loss of speech (and with it the inability to repeat from dictation, or to read aloud, both of which involve externalized speech) remains the sole difficulty. The interpretation of cases presenting more complex symptoms forms a significant portion of current discussions. The presence of some degree of paralysis and the more rapid assumption of spoken speech upon recovery are characteristics of the subcortical type of motor aphasia. [The imitation test is the proper one here, since this form of aphasia involves verbal amnesia.—J.M.B.].

VI. *Sensory Aphasia.* The characteristic loss in sensory aphasia is that of the comprehension of words heard or read; the most frequent concomitant symptoms are paraphasia and agraphia. It presents two varieties, according as the auditory or the visual centre is involved; these centres are independent, and the one may be affected with complete integrity of the other. So far as the memory images connected with these centres are utilized in other speech processes will such other processes be affected by injury to the sensory centre; internal language is more affected by loss of auditory than of visual word memories, because the primary revival of words is closely related to the fundamental auditory associations. Although many cases exhibit both auditory and visual defects, it seems best to consider the two classes separately.

(*a*) *Auditory Aphasia.* The characteristic symptom of cortical auditory aphasia is termed word-deafness, and consists in an inability to interpret words which are, however, distinctly heard. The ability to comprehend the meaning of other sounds than words may remain intact. Such cases of pure auditory word defect are uncommon, but they do occur, and their cortical localization is known (see above). The word-deafness may be incomplete; the patient may understand his own name or other familiar names, or again, he may recognize a few common words in simple sentences, and guess the meaning of the rest; he may retain the power to interpret one language, but not others, and so on. One who is word-deaf can obviously not write from dictation. Reading to one's self (internal reading) is apt to be disordered because and in so far as reading involves the transmission of impulses from the visual to or through the auditory area, in the revival of word-memories which is a part of such reading. Paralexia is thus a frequent symptom. As in speaking one

hears and understands the words he speaks, and thereby corrects any accidental *lapsus linguae*, the inability to understand words renders such directive and corrective aid impossible, and the result is a constant succession of *lapsus linguae* or paraphasia, which is the more marked on account of the loquacity often characteristic of this type of speech defect. If the recall of words is almost exclusively in auditory terms with the visual word memory weak, e. g. for illiterate persons, word-deafness may profoundly affect speech; other such patients prefer to answer in writing because of their more certain control over visual word memories. A defect of special interest in connection with word-deafness is musical deafness, tone-deafness, or amusia; this rarely occurs as a separate defect but often as a concomitant of word-deafness. The power to interpret and recognize tones and arias is lost in a way analogous to word-deafness. Some writers regard the evidence of such cases as indicative of a special musical centre (see Elder, as cited below, chap. x, and Baldwin, *Ment. Devel. in the Child and the Race*, chap. xiv. § 2, and citation from Starr on p. 71).

Another interesting symptom is verbal amnesia, or the inability to recall the sound of a word although the idea is in the mind. It is thus the converse of word-deafness; in the latter the sound does not arouse the idea, in the former the idea does not suggest the sound. Disorder of the auditory centre may involve both forms; and amnesias are characteristic of sensory as opposed to motor aphasias.

It should be emphasized that, clinically, auditory aphasia is a factor in a complex aphasic disturbance rather than an independent disorder; typical cases cited as auditory aphasia almost invariably involve disturbances in other sensory or motor speech processes.

(*b*) *Visual Aphasia.* The characteristic symptom of cortical visual aphasia is termed word-blindness or alexia, and consists in an inability to interpret written or printed symbols, which, however, the eyes distinctly see. Pure cases of this defect are rare (by some denied altogether), but its association with disease in the angular gyrus is well established. Its most frequent concomitant symptom is agraphia; while some degree of aphasia and word-deafness may be present. Its anatomical relations may bring about a right homonymous HEMIANOPSIA (q. v.), or inability to see objects in the right halves of the visual fields. This is explained by the fact that the fibres near and subjacent to the left angular gyrus are connected with the left half of the retina in the *right* visual field. See LOCALIZATION (cerebral), and VISION (Fig. 7). When the lesion is strictly limited to the visual word-centre, hemianopsia is not present; but it is a frequent symptom because of the frequent involvement of fibres to the true visual area (half-vision centres). In the most typical cases of visual aphasia the interpretation of visual signs other than words—money, cards, chess, figures, &c.—is intact. Objects are recognized, and their uses indicated; such indication being obtainable by indirect means when speech is affected. Sometimes letters or even syllables may be recognized individually, but words remain unreadable. Such variations represent differences in degree of the defect and may reflect the mode of acquisition of verbal memories. Similarly cases of blindness to words in one language but not another (sometimes) occur, and some degree of object-blindness (see ASEMIA, also MIND-BLINDNESS) may be present with it; i. e. the memory for form and colour, for faces and distinctive features of persons and things, may also be affected. The common retention of the power to read one's name has already been noted; and in cases of partial visual aphasia portions of sentences may be read and the remainder guessed from the context, but always with hesitation and uncertainty. The ability to read numbers is quite commonly retained.

In complete visual aphasia the power to write is lost because that power is so largely dependent on visual factors; and of course such patients could not read what they have written if they could write. Writing is possible in dependence upon the kinaesthetic sensations accompanying the movements of the fingers in guiding the pen; hence if the patient's hand be slowly guided and the letters formed for him he may be taught to write, as the blind write, by dependence upon motor memories. On the other hand, writing or print may be copied, but the process is a purely imitative one; print is copied as print, and the handwriting is reproduced much as a forger would do it.

A related symptom to word-blindness, and one which frequently accompanies it, is inability to name an object when seen; e. g. a knife when seen cannot be called by its name, although the patient may say it is 'something

to cut with.' On the other hand, objects which appeal strongly to other senses as well as to sight, are more apt to be named readily; while names appealing directly to auditory or kinaesthetic sensations remain unaffected. This symptom has been termed optic aphasia (Freund), and has been regarded as indicative of a special naming centre (Broadbent, Mills). There is also an amnesic defect, a psychic blindness for words, in which the patient is able to read letters and words, but does not understand them when read; he hears and understands spoken words, but does not realize that the words he hears are the same as those he reads or copies.

Subcortical forms of auditory and visual aphasia have been described, although pure and definite cases and cases connected with consistent pathological findings are very uncommon. In the visual subcortical form an important characteristic is the retention of spontaneous writing and of writing from dictation. The main loss is that of the power to read because the impressions do not reach the visual word-interpreting centre. That this centre is intact may be indicated by the ability to trace letters with the fingers, and again by the power to spell. Copying is done literally, as in drawing, and not in free handwriting. Hemianopsia is generally present. More complex cases, in which the lesion encroaches upon the angular gyrus, or is accompanied by irregularities in other speech processes, are described in the literature. Still less frequent are pure cases of subcortical auditory aphasia. Its differentia from the cortical defect are the preservation of spontaneous speech, the absence of any verbal amnesia, and the patient's ability to read aloud, to write, to copy, and to read what he and others have written (cf. the diagrams).

VII. *Other disorders of speech and kindred defects.* It remains to consider (*a*) transcortical forms of aphasia, (*b*) functional aphasia, (*c*) complex forms, and (*d*) related disorders.

(*a*) The conception of a transcortical aphasia (also termed associative and conduction aphasia—Leitungsaphasie of Wernicke, and interpictorial of Wyllie) arises from the consideration of the results of a lesion in the associative fibre-systems connecting the speech centres with one another. The clinical existence of such cases, the determination of the symptoms in differentiation from those of other speech defects, and the localization of a limited injury (not involving the speech centres) in post-mortem examination, are all matters of doubt and of difference of opinion. The clearest case seems to be that of a lesion between the auditory and the motor speech centre, such lesion affecting the fibres passing under the Sylvian fissure, or in the island of Reil; the symptoms are the inability to talk correctly, paraphasia, but without word-deafness, or deficiency in speech, and indeed without complete incapacity of any speech process. The auditory and motor centres are intact, but the destruction of the bond between them introduces defective performance of speaking and possibly of writing. It is possible to deduce the effects of a loss of connection between visual and auditory, between visual and motor centres, and so on; but it is rarely, if at all, possible to substantiate such defects along with the functional integrity of the centres concerned.

In many diagrams a separate ideational or apperceptive centre is posited which is in connection with the several speech centres. An interference with the connection of the auditory and ideational centre would produce a condition termed suprapictorial auditory aphasia by Wyllie and Elder; the symptoms of such defect are the inability to understand what is heard (and secondarily what is read; Wernicke and Lichtheim), but the retention of the ability to repeat what is heard, and to read aloud, though both without understanding; likewise, the ability to write, though mechanically, and a certain degree of error in all these processes. [That is, the mimetic, imitative, or 'third level sensori-motor' speech processes remain intact.—J.M.B.] Similar defects traceable to interference between the visual or the motor and the ideational centre have been described, but their differentiation from other forms of aphasia is difficult.

(*b*) There are many functional disturbances of speech presenting symptoms analogous to those described, differing only in their evanescent character, and having interesting stages of progress in recovery. A temporary inflammation, compression, or congestion (see aetiology below) may produce evanescent symptoms of organic aphasia. Aphasic disturbances due to poisoning (toxaemia) or infectious fevers present differences of origin and progress, but require no separate description.

Among functional nervous disorders, HYSTERIA (q. v.) presents peculiar speech defects. Hysterical aphonia is the most common of these, and consists in inability to approximate

the vocal chords and hence to speak loudly. Hysterical mutism, unlike the former, is a true speech disorder which renders the patient absolutely mute, although its hysterical nature is revealed by the anxiety to speak, fluency in writing, and the presence of hysterical stigmata. Stuttering and stammering, a defective memory for words, confusion in pronunciation and writing, are examples of speech defects, characteristic of periodic nervous affections, such as migraine, and of weakened conditions of the nervous system, such as neurasthenia, exhaustion, &c. Aphasic symptoms are apt to appear in epilepsy and in various forms of insanity (see Wyllie, as below, chap. xiv).

(*c*) It has been repeatedly implied that a compound injury to several speech centres is a common occurrence. Such cases may be termed complex aphasia; a very frequent form is a compound sensory aphasia involving the auditory and visual speech centres. Those who hold to a special graphic centre must admit its frequent involvement in connection with articulatory motor aphasia. In such cases the symptoms include the combination of symptoms of both disorders and occasionally additional difficulties. Cases of total aphasia are those involving all the speech centres, although not necessarily a complete loss of the several functions (a good case is given by Collins, as below, chap. vii). Many cases of compound aphasia are due to interference with the function of the Sylvian artery which supplies the speech areas with blood.

(*d*) The existence and nature of graphic-motor aphasia or agraphia demand special notice. The relations of writing to, and in part its dependence upon, the other speech factors, particularly articulation, the guidance of writing by vision, the tendency of words to be internally perceived in auditory terms, have been noticed above; these relations help to explain why agraphia is a common symptom in visual and auditory defects, and an almost constant one in cortical motor aphasia. Agraphia as an induced or concomitant symptom of speech defects is thus fully recognized. Does it, however, occur as a result of injury to a specific graphic centre? If so, how can such agraphia (which may be termed cortical graphomotor aphasia) be differentiated from other forms of agraphia? And what theoretical considerations favour the existence of such a centre? In reply it must be noted that unambiguous cases of inability to write with the right hand, with retention of power to perform other movements, and with no other speech defect, and in turn associated with a sharply localized pathological finding, do not exist. The existence of cortical motor aphasia, even when strictly confined to the convolution of Broca, without agraphia, is disputed; but the fact that in recovery from such aphasia, agraphia may persist after the aphasia disappears is admitted. This may be interpreted as due to lesion in the association-fibre system between the motor articulatory and the graphomotor centre, but, like all such evidence, has been differently construed. That the graphic centre is not pathologically separable from the centres for the hand seems established. As to symptoms, the chief point to be noted relates to the characteristics of the writing, whether lost to the right hand only, whether the left hand in writing reproduces the characteristic handwriting or simply writes under purely visual guidance, and whether there are errors of writing, and of what character. On the basis of such distinctions attempts have been made to differentiate a true graphic-motor aphasia. There seems considerable reason to suppose, in the left hemisphere, a function connected with writing which is not present in the right hemisphere. For while writing, like drawing, is closely dependent upon visual images, the fluency and characteristic appearance of one's handwriting involves an additional kinaesthetic factor. Ordinarily these two factors are inseparable, and the dominance of the visual factor may obscure the other. The writing of the congenitally blind is in terms of the kinaesthetic factor, and a case of agraphia in such a person might be instructive. The differences and resemblances between writing with the right hand and with the left have also been regarded as significant in this respect; the similarity for those who can write with both hands is regarded as due not to visual control, but to the single graphic centre. The tendency for some persons, when writing with the left hand, to produce MIRROR-WRITING (q. v.) has also been interpreted as the result of the kinaesthetic impulse originating in the graphic centre (see Elder, as below, chap. ix). Cf. HANDWRITING.

A peculiar speech defect has been described under the term dyslexia, which is akin to word-blindness, but differs from it in that the patient can read and understand, but for a brief period only; he quickly loses the power, but after a rest regains it. The defect

may extend to the interpretation of other visual symbols, being a form of mental blindness, and may be interpreted without regarding it as a distinctive disorder of speech.

The close relation of the specific speech centres to the more general sensory and motor centres results in the occurrence of many general defects along with aphasic disorders; and as a rule such occurrence is a mark of more extended and serious injury, and may affect the general intelligence. A more general auditory defect than word-deafness may extend to music, and to the interpretation of ordinary sounds, and thus constitute mental DEAFNESS (q.v.). The fact that so large a portion of perception is in visual terms gives unusual prominence to mental BLINDNESS (q.v.). It is important to test whether the blindness extends to the perception of numbers, of the meaning of cards and other objects used in games, to the recognition of the common objects on the table and about the room, to the signs whereby one finds one's way, and so on. There is often a partial and curiously limited object blindness, which requires for its interpretation a knowledge of the patient's normal habits of acquisition. When the defect is a very general one, so that no signs, conventional and others, are interpreted, the defect is termed ASEMIA (q.v.) or asymbolia. On the motor side the loss of articulate speech usually leaves the patient his command over gestures and other signs; when this is lost the condition is termed amimia; or when such gestures are confused, paramimia. The inability to handle familiar objects properly is similarly termed APRAXIA (q.v.). It is by some regarded as a general motor and sensory defect, of which similar defects just noted are special instances; i.e. it involves an inability to recognize objects, to whatever senses they present themselves, and to use them under guidance of the sensations which their manipulation would ordinarily arouse.

Throughout this presentation the speech defects of normal persons have alone been considered. It is obvious that the speech processes of a deaf-mute present important variations from the normal type. Carefully devised tests of their speech processes and the study of speech defects in such persons may contribute considerably to the illumination of doubtful points in this field. A case of aphasia in a deaf-mute is cited by Elder, as below, 233.

VIII. *Aetiology and diagnosis.* The organic and the functional or dynamic aphasias are connected with quite distinct disorders. The latter occur in connection with such neuroses as epilepsy, neurasthenia, hysteria, and migraine; and again with toxic disturbances, such as uraemia, diabetes, and gout, and in poisoning by alcohol, santonin, tobacco, and other substances. The inability to name objects, the frequent speaking of wrong words, paraphasia, characteristic of migraine, and indeed of other nervous conditions and states of exhaustion, may serve to illustrate the slighter forms of functional aphasic defect.

The most frequent cause of aphasic symptoms is cerebral apoplexy, which occurs usually in maturity and advanced age. Any condition which produces pressure or irritation of the speech areas, such as abscess, tumour, and direct injury, may induce aphasia. The pathological growth is often confined to a sharply localized area, and gives rise to precise aphasic symptoms; the sudden onset of the attack, the nature of the partial recovery as the clot is absorbed, the interruption of blood supply to certain centres, may be definitely reflected in the combination of resulting aphasic symptoms. The fact that nearly all the convolutions connected with special functions receive their blood supply from the middle cerebral or Sylvian artery accounts in part for the frequency with which various forms of aphasia concur in the same patient.

It is evident that a careful differential diagnosis is often imperative to determine the nature and seat of aphasic disorders. A typical enumeration of tests for this purpose is given by Elder as follows: Can the patient hear (1) sounds of any kind, (2) words spoken; (3) can he understand spoken words; can he see (4) objects, (5) printed or written words; (6) can he understand them; (7) can he speak voluntarily; (8) can he repeat words; (9) can he read aloud; can he write (10) voluntarily, and (11) from dictation; (12) can he copy, and how? Subsidiary tests are the ability to read silently and to indicate the number of syllables contained in a word. As types of such diagnosis, may be mentioned that affirmative answers to 2, 3, 5, and 6, and negative answers to 7, 8, 9, 10, 11, 12, indicates cortical motor aphasia; affirmative answers to 2, 3, 5, 6, 10, 11, 12, and negative answers to 7, 8, 9, subcortical motor aphasia; affirmative answers to 5, 7, 10, and negative answers to 2, 3, 6, 8, 9, 11, 12, auditory cortical aphasia; affirmative answers to 2, 3, 7, 8, and negative answers to 5, 6, 9, 10, 11, 12, cortical

sensory aphasia, and so on. The transcortical varieties and other forms not clearly represented in clinical experience may be readily illustrated by the replies to these questions and by corresponding diagrams. Thus transcortical motor aphasia involves affirmative answers to 2, 3, 5, 6, 8, 9, 11, and negative answers to 7, 10, 12. It must be added, however, that not all of these differentia command equal importance or receive common interpretation at the hands of different writers.

Literature: COLLINS, The Genesis and Dissolution of the Faculty of Speech (1898); ELDER, Aphasia and the Cerebral Speech Mechanism (1897, with bibliog.); PERSHING, The Disorders of Speech, Twentieth Cent. Pract. of Med., x (1897); WYLLIE, The Disorders of Speech (1894); BASTIAN, Aphasia and other Speech Defects (1898); BATEMAN, Aphasia or Loss of Speech in Cerebral Dis. (1868, rev. 1890); WERNICKE, Der aphasische Symptomencomplex (1874), and later papers in Gesammelte Aufsätze (1893); KUSSMAUL, Die Störungen d. Sprache (1877), trans. in Ziemssen's Cyc., xii; LICHTHEIM, Aphasia, Brain (Jan., 1885); FREUD, Zur Auffassung d. Aphasien (1891); BERNARD, De l'Aphasie et ses diverses Formes (1885 and 1889); CHARCOT, Lects. on Dis. of the Nerv. Syst., iii, and other papers; HUGHLINGS JACKSON, On Affections of Speech, Brain (1879–80), 203–323; BROADBENT, Cerebral Mechanism of Thought and Speech, Med. Chir. Trans. (1872, 1878, 1884), and Brain (1879); MILLS, Nerv. Dis. by Amer. Authors (Dercum), 1895; BANTI, Afasia e sue forme, Lo Sperimentale (1886); MIRALLIÉ, Les Aphasies sensorielles (1896); DÉJERINE, C. R. Soc. de Biol. (1891–2); SÉRIEUX, ibid.; OGLE, Aphasia and Agraphia, St. George's Hosp. Rep., ii. 83–121; BALDWIN, Ment. Devel. in the Child and the Race, chap. xiv; SÉGLAS, Les Troubles du Langage chez les Aliénés (1892); LIEBMANN, Vorlesungen über Sprachstörungen (1895); PITRES, L'Aphasie amnésique, Progrès Méd. (1898); FERRAND, Le Langage, la Parole et les Aphasies (1894); MORSELLI, Semej. malat. ment., ii; RICHET, Dict. de Physiol., sub verbo; STARR, Familiar Forms of Nervous Disease (1891), chap. vii; A. PICK, Proc. Int. Med. Cong., Paris (1900). See also much of the literature of INTERNAL SPEECH. (J.J.)

Spencerianism. The 'synthetic philosophy' of Herbert Spencer. Various aspects of Spencer's views are presented under NATIVISM AND EMPIRICISM, PSYCHOLOGY, SOCIOLOGY, UNIVERSAL POSTULATE, EVOLUTION, and UNKNOWABLE. See also GHOST THEORY, PLAY, and ART. An epitome of the synthetic philosophy has been published by Collins. (J.M.B.)

Spener: see PIETISM.

Sperm [Gr. *σπέρμα*, seed]: Ger. *Samen*; Fr. *sperme*; Ital. *sperma*. Seminal fluid; the liquid secreted by the male genital apparatus.

In man it consists of spermatozoa from the testes, and secretions from accessory parts, chiefly the seminal vesicles and prostate gland. (C.S.M.)

Spermatogenesis [Gr. *σπέρμα*, seed, + *γένεσις*, origin]: Ger. *Samenbildung*; Fr. *spermatogenèse*; Ital. *spermatogenesi*. The production or development of male elements or spermatozoa.

The process comprises three stages: (1) the multiplication by ordinary CELL-DIVISION (q. v.) of the cell parents of the spermatozoa; the parent or mother-cells are also called spermatogonia (Ursamenzellen); (2) the REDUCTION DIVISION (q. v.) of a parent-cell, so as to form by two divisions four daughter-cells (spermatoblasts or spermatids), each with half the number of chromosomes, characteristic of the parent-cells of the species; (3) the gradual differentiation of the daughter-cells into spermatozoa by progressive changes in form or structure. See also SPERMATOZOON. That there are always four daughter-cells is probable, but the generalization has not yet sufficient observational basis. Cf. EMBRYOLOGY.

Literature: E. B. WILSON, The Cell (2nd ed.); MINOT, Human Embryol. (presents many details, but was written before the nature of reduction division was understood); Embryologies of recent date. (C.S.M.)

Spermatozoon: see SPERM-CELL, and cf. FERTILIZATION, and REPRODUCTION.

Sperm-cell: Ger. *Spermzelle*; Fr. *cellule spermatique*; Ital. *cellula spermatica*. A cell, out of which a spermatozoon is to be developed; an immature spermatozoon, or male reproductive cell. See GERM-CELL, and FERTILIZATION.

Literature: E. B. WILSON, The Cell in Devel. and Inheritance (2nd ed., 1900); HERTWIG, Die Zelle (1893). (C.S.M.)

Speusippus. (395 ?–339 B. C.) Nephew of Plato, who instructed him in philosophy. He accompanied Plato to Syracuse, and succeeded him as leader of the Academy. His writings are lost.

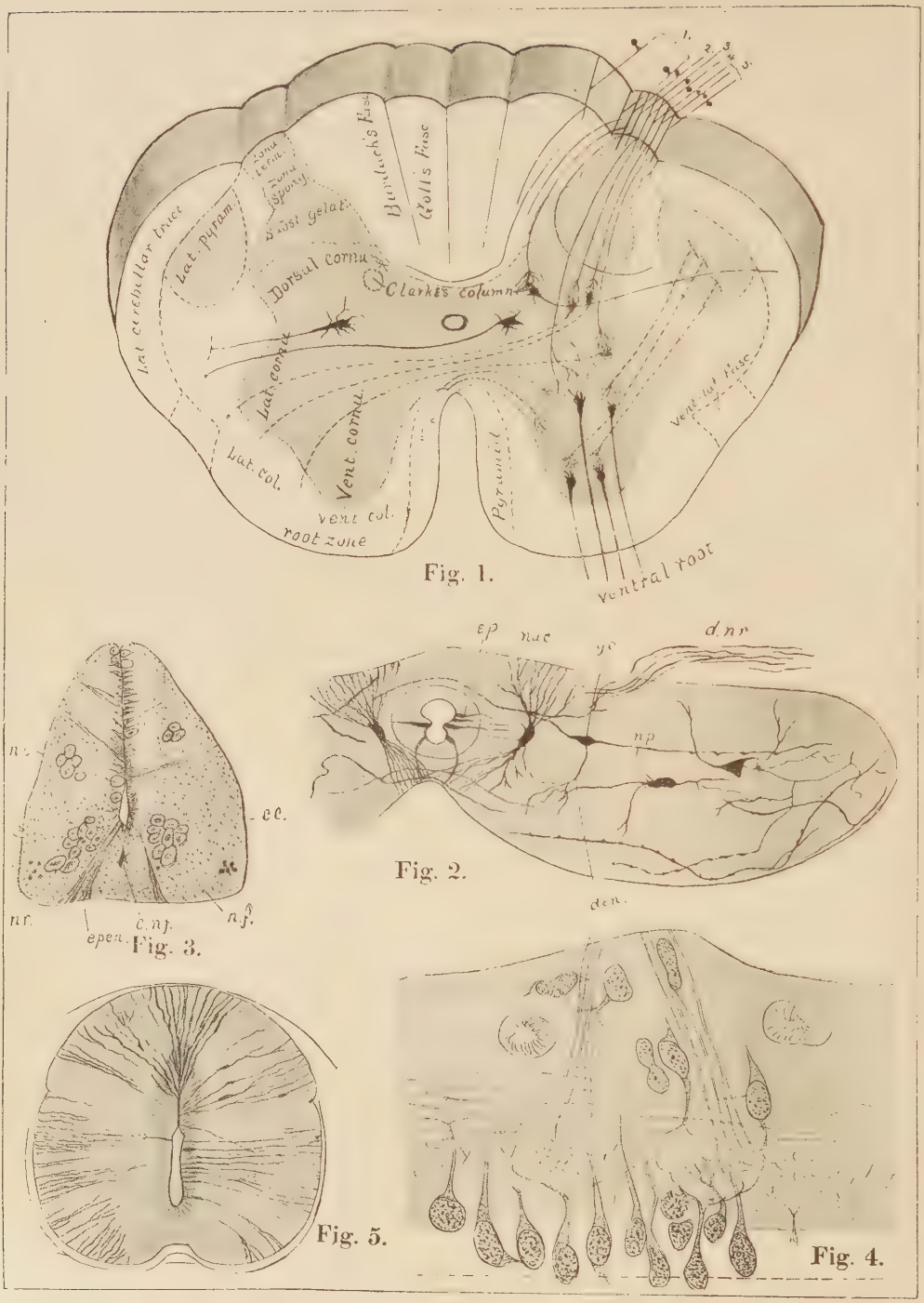


Plate A (**Spinal Cord**).

Fig. 1. Ideal section of the cord, showing the position of the cornua, dorsal and ventral commissures, columns of white matter, and the course of the nerve root fibres. From Edinger.

Fig. 2. A transection of the spinal cord of Myxine. *d.nr.*, dorsal nerve root; *gc.*, nerve cell; *np.*, neurite; *nuc.*, neuroglia cell; *den.*, dendrite; *ep.*, ependyma cell. From C. L. Herrick.

Fig. 3. Transection of the spinal cord of Amphioxus. After Rhode.

Fig. 4. Horizontal longitudinal section of the spinal cord of a tailed amphibian at the exit of a nerve.

Fig. 5. Ependyma cells in the spinal cord of a seven days' chick, treated by the Golgi method (Kölliker).

Sphygmograph: see LABORATORY AND APPARATUS, III, B.

Spinal Cord: Ger. *Rückenmark*; Fr. *moelle épinière*; Ital. *midolla, midolla spinale.* The least altered portion of the medullary tube, extending throughout almost the entire length of the trunk to the lower limit of the medulla oblongata, a point usually coinciding with the lower opening of the cranium.

The cord is usually enclosed in the vertebral canal of the backbone. The spinal cord communicates with the body at large by means of nerves, whose roots form a dorsal and a ventral series. The ventral nerve-roots are composed of fibres, which arise as neurites of cells in the ventral cornua and pass continuously to the muscles or other kinesodic structures. The fibres of the dorsal roots nearly all arise in the nerve-cells of the spinal ganglia and send their neurites centrally into the spinal cord, while their dendrites are produced as sensory nerve-fibres. Cf. WALLER'S LAW. The distinction between the dorsal nerves as sensory and the ventral as motor constitutes Bell's Law (1811). See NERVOUS SYSTEM (*Nerves*), and DEGENERATION (nervous).

On account of the greater nervous supply required by the segments of the cord innervating the limbs, these portions (intumescentia cervicalis et lumbalis) are greatly enlarged. To how great an extent the segmentation of the cord is due to the vertebral arrangement is uncertain. The spinal nerve-roots are plainly segmentally arranged; their central connections within the spinal cord are more obscurely so; and the cutaneous areas corresponding to these medullary segments do not agree with those of the root segments.

The original tubular character of the cord is maintained during life, the original cavity persisting as the canalis centralis. See NERVOUS SYSTEM (Histology). The topography of the cord may be gathered from Plate A (Spinal Cord), Fig. 1.

It should be added that the grey matter between the dorsal and ventral horns contains the centres for visceral reflexes connected with the sympathetic system. Afferent visceral impulses probably terminate in Clarke's column, while efferent impulses arise from cells of the lateral horn, paracentral nucleus, and intermediate zone (Onuf and Collins).

The longitudinal tracts which clothe the grey matter are massed, according to function and source, into columns or fasciculi, while the grey matter is aggregated into cornua connected by the dorsal and ventral commissures respectively.

Upon the relations of the spinal nerves, cf. NERVOUS SYSTEM (Spinal Nerves). The dorsal root-fibres divide, after entering the cord, into ascending and descending branches, from each of which collaterals arise and pass to various regions of the cord. The best known relations are represented in Plate A, Fig. 1. Cf. also the accompanying figure from Kölliker. The sensory fibres traverse the cord for a longer or shorter distance, and then in many cases communicate with dendrites of cells whose neurites pass towards the brain as

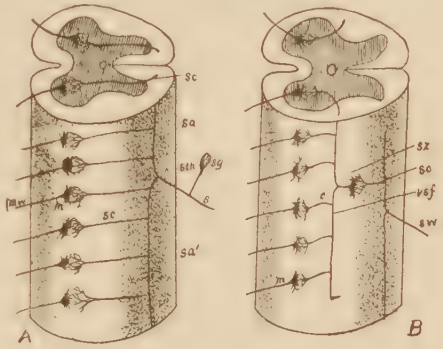


Fig. 1. *A*, Direct reflex path. *sg*, spinal ganglion; *sa* and *sa'*, ascending and descending branches of root-fibres; *sc*, collateral; *m*, motor neuron; *mw*, motor root-fibre.

B, Indirect reflex path. *sz*, intercalary, or column cell; *vsf*, neurite of *sz*; *c*, collateral from *vsf*.

secondary sensory tracts. Others send collaterals directly to the ventral cornu cells, thus forming the direct reflex arc. The direct reflex arc is illustrated by Figs. 2 and 3 (after Cajal). The indirect reflex path is illustrated in Fig. 1, *B*.

Impulses entering the dorsal roots reach the cortex mainly in two ways: (1) by means of collaterals, which communicate with ascending fibres of the lateral columns of the opposite side; (2) by direct prolongations of the root-fibres, which enter the columns of Burdach and Goll. The latter terminate in the nuclei of the funiculus gracilis and cuneatus of the medulla, and here enter into relation with a secondary system, the lemniscus. These fibres cross in the medulla, and, like the others, reach the cortex of the opposite side.

The fibres of the motor columns, on the other hand, originate in cells of the cortex in the motor areas. In part they cross in the decussation of the pyramids in the medulla and

enter the opposite lateral pyramids. Others descend uncrossed in the ventral pyramids. The dendrites of the motor cells in the ventral cornua are associated with the arborizations of the fibres from the pyramidal columns. In the case of the lateral pyramids the association is with the cells of the same side, while the ventral pyramidal fibres cross in the ventral commissure. Thus we see that, as all sensory impressions cross before reaching the brain, and there excite the cortex of the opposite side, so all motor stimuli originating in the cortex emerge from the ventral roots of the spinal cord on the opposite side.

The fibres which collect in Clarke's columns and subsequently enter the lateral cerebellar columns seem to have a relation to the function of co-ordination of motion.

The columns of white matter undoubtedly constitute the main paths of conduction in the cord, but the grey matter is coming to be regarded as also playing a very important part. It contains, besides the nerve-cells, a dense mesh of finest fibrils derived from collaterals from both ascending and descending fibres. These, besides providing for the spinal reflexes, undoubtedly play some part in the transference of stimuli. See SUMMATION.

The accompanying diagram (Fig. 4) represents the course pursued by the sensory and motor stimuli to and from the cortex, as well as the associational and commissural fibres of the latter. See ASSOCIATION FIBRES.

The various tracts of the cord are intimately bound together by innumerable collaterals, and their analysis is a matter of extreme difficulty. An important aid in this analysis is the fact that in foetal life the fibres of the sensory columns become medullated before the motor, so that at this stage their separation is easy. Our most exact knowledge, however, has been obtained by the methods of degeneration. See NEUROLOGY (Technology).

Hemisection of the cord destroys the skin

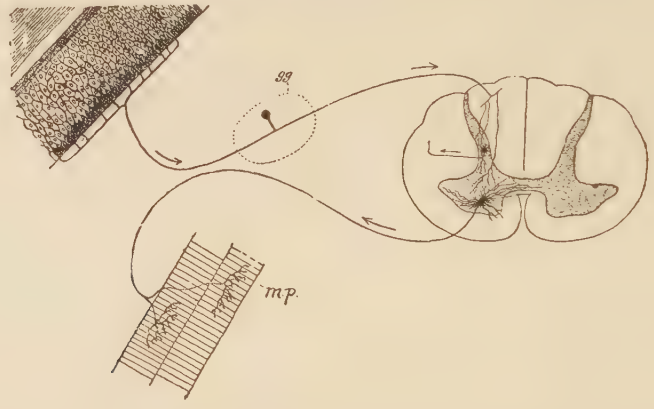


Fig. 2. Diagrammatic transection of the spinal cord. Arrows represent the course of the stimulus from the sensory areas of the skin to the dorsal cornua via the spinal ganglion (*gg*), and by way of the motor root to the muscle plates (*m.p.*).

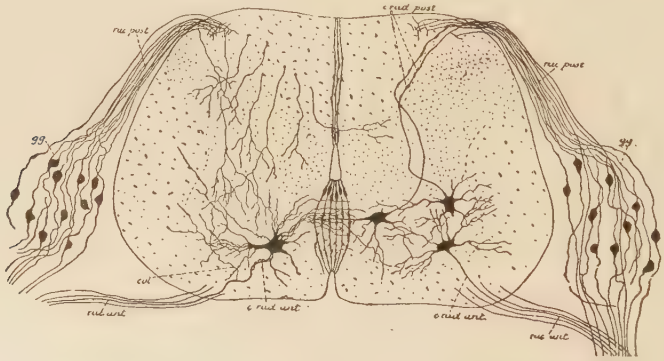


Fig. 3. Transection of the spinal cord of the chick, illustrating the relations of the spinal nerves.

sensation of the opposite half of the body as a result of the decussation of the secondary tract fibres in the ventral commissure of the cord and the raphe of the medulla. Disease of the pyramidal tracts disturbs voluntary motion and produces tonic contractions. Injury to the dorsal root-fibres interferes with skin sensation, while disease of the secondary sensory tracts may leave the skin sensation nearly intact, but impairs the muscular sense.

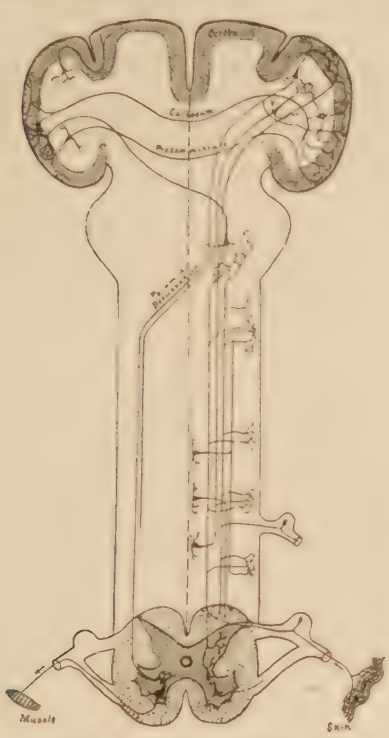


Fig. 4. (See the preceding page.)

Respecting the conductivity and other properties of the cord, as investigated by the electrical method, it is found that cortical excitation produces galvanic excitation in the cord, and such excitation is to a certain extent localizable. The electrical effects following corona radiata excitation are only half those following cortical stimulation. The normal discharge is unilateral, and the limitation to one side is more perfect when the corona is stimulated than when the stimulus is cortical. The spread of impulses from path to path is greater in the dorsal columns in the ascending direction, and in the lateral column in the descending. The direct path of afferent impulses is localized in the dorsal column of the same side. The indirect paths are in the dorsal columns of the opposite side and in the lateral column of the same side as the excited nerve.

The histogenesis of the cord is essentially the same as that of the brain; the neuroblasts arise as free cells among the spongioblasts of the medullary epithelium and develop processes from either pole. The neurites of the ventral cornu cells emerge to form the ventral root-fibres.

Among lower animals the spinal cord of Amphioxus presents an exception, in that the cavity remains a vertical slit: see Fig. 3, Plate A (Spinal Cord). The supporting material is not differentiated beyond the development of the original endyma. The nerve-cells retain their position near the ventricle. It is supposed that the homologues of the spinal ganglia remain unseparated from the cord. Remarkable colossal cells, the significance of which is doubtful, also occur. In most aquatic vertebrates a set of large fibres (Mauthner's or Müller's fibres) run the entire length of the spinal cord, and are associated in the medulla with the acoustic tracts. They seem to be concerned with equilibrium in a fluid medium. In all vertebrates (but more highly developed in lower forms) there is a peculiar rod-like fibre running through the ventricular cavity of the brain and spinal cord from the roof of the mid-brain to the lower end of the canalis spinalis, known as Reissner's fibre. It is formed by the fusion of axis cylinders from very large cells in the roof of the mesencephalon and also in the caudal end of the spinal cord (Sargent), and it gives off fibrils to the grey matter of the spinal cord. Its function seems to be to provide a direct connection between the visual reflex centres and the body musculature. In the electrical fishes specially modified cells occur in the dorsal regions which supply the electric nerves. See Electric Organs.

In embryos and lowest vertebrates the support of the myelonic tissue is entirely afforded by the epithelial layer of the ventricle (spongioblasts). It is still uncertain whether the neuroglia of the adult cord is derived solely from this source. In disease the neuroglia increases in much the same way as in the brain.

Literature: Bechterew, Ueber die Bestandtheile der Hinterstränge des Rückenmarks, Neurol. Centralbl. (1885); Arch. f. Anatomie u. Physiologie, Anat. Abth. (1886);

ibid. (1887); Ueber die verschiedenen Lagen und Dimensionen der Pyramidenbahnen, Neurol. Centralbl., ix (1890), x (1891); RAMON Y CAJAL, L'anatomie fine de la moelle épinière, Atlas der pathologischen Histologie des Nervensystems, redigirt von V. Babes, iv. Lieferung (Berlin, 1895); EDINGER, Einiges vom Verlauf der Gefühlsbahnen im centralen Nervensystem, Deutsche medicinische Wochenschr. (1890); GOTCH and HORSLEY, On the Mammalian Nervous System, its Functions and their Localization determined by an Electrical Method, Philosophical Trans., clxxxii. B (1891); W. R. GOWERS, Neurol. Centralbl., v (1886); VON KÖLLIKER, Zur feineren Anatomie des Rückenmarks, Zeitsch. f. wiss. Zoologie, li (1890); J. N. LANGLEY, Recent Observations on Degeneration, a Critical Account, Brain, ix (1886; refers to most of the important papers up to date); M. VON LENHOSSÉK, Ueber den Verlauf der Hinterwurzeln im Rückenmark, Arch. f. mikr. Anatomie, xxxiv (1889); Anat. Anzeiger (1896); V. MARCHI, Rivista sperim. di Freniatria, xiii (1888); MARCHI and ALGERI, Sulle degenerazioni consecutive, ibid. (1887); E. S. REYNOLDS, On Changes in the Nervous System after Amputation of Limbs, Brain, ix (1887; with bibliography); K. SCHAFFER, Vergleichend-anatomische Untersuchungen über Rückenmarksfaserung, Arch. f. mikr. Anatomie, xxxviii (1891); C. S. SHERRINGTON, On Secondary and Tertiary Degeneration in the Spinal Cord of the Dog, J. of Physiol. (1885); ibid., x (1889); and Brit. Med. J. (1890); E. C. SPITZKA, J. of Compar. Med. and Surg. (1886); W. WALDEYER, Ueber den Verlauf der hinteren Nervenwurzeln, Sitzber. d. Ges. naturf. Freunde (Berlin, 1889); ONUF and COLLINS, Archives of Neurol. and Psychol., iii (1900); P. E. SARGENT, Anat. Anz., xvii (1900). See also the literature lists under BRAIN, DEGENERATION (nervous), and NERVOUS SYSTEM, and other neurological topics. (H.H.)

Spinoza, Baruch (or **Benedict**) **de.** (1632–77.) Born at Amsterdam, of Jewish parents, he received a good education, with a view to becoming a Jewish rabbi, ending with the Old Testament, the Talmud and commentaries, and the scholastic philosophers; became sceptical of the past, and strongly inclined towards the Cartesian philosophy. Discarded both Judaism and Christianity, and embraced a pantheistic conception of the world. Expelled from the synagogue at Amsterdam, he wrote a protest against his anathema, and changed his name to Benedict. Secluded himself, to avoid persecution, near Amsterdam, 1656–61. Resided in Rynsburg until 1664, in Voorberg until 1669, in Scheveningen 1671, until his death. He was never married. See topics cited under SPINOZISM.

Spinozism: Ger. *Spinozismus*; Fr. *Spinozisme*; Ital. *Spinozismo*. The philosophy of Spinoza, also philosophy of the type of Spinoza's. A notable exposition is Pollock, *Spinoza, his Life and Philosophy* (2nd ed., 1899). See METAPHYSICS, PHILOSOPHY, IDEALISM, and PANTHEISM. (J.M.B.)

Spirit (and **Spiritualism**) [Lat. *spiritus*, from *spirare*, to breathe]: Ger. *Geist*; Fr. *esprit*; Ital. *spirito*. I. Common to all meanings of 'spirit' is the conception of that which is conscious. Consciousness itself is not conceived as *being* spirit, but as being an attribute of it; so that spirit is conceived as something capable of existing, even when it is not conscious. On the other hand, there is no positive conception of *what* this permanent element in spirit is; it is only conceived abstractly as *that* (whatever it may be) which is the substance or subject of consciousness, and negatively as not identical with any known quale: e. g. even those who hold that consciousness is an attribute of material substance would not therefore say that matter was spirit, but only that there was no such thing as spirit. Hence:

(1) 'Spirit' and 'mind' may be used synonymously to denote merely this conception, without any implication as to the kind of consciousness, if any, possessed by the subject in question. It is mainly in this sense that all existents are commonly divided into 'spiritual' or 'mental' on the one hand, and 'material' on the other.

But (2) by '*a* spirit' or 'mind' is meant any collection of spiritual existents which are bound together by the relations constituting personal identity. Hence 'spirit' and 'mind' themselves sometimes imply personal identity, i. e. exclude any subject of consciousness which is not either *a* spirit or part of a spirit. 'Soul' always thus implies personal identity.

(3) 'Spirit' may be used, in distinction from 'mind,' to denote exclusively the subject of some particular form of consciousness, with an implication that such form is 'higher' or better than others. Thus:

(*a*) A mind may deserve to be called

a spirit only if, either with or without other forms of consciousness, it possesses 'reason' and deliberate choice. 'Reason,' as thus defining spirit, is never understood in a purely psychological sense, but always as implying that some at least of the objects cognized by it are true.

(*b*) 'Spirit' may denote a subject, whose only cognitive form of consciousness is 'reason,' in that sense in which 'reason' is incapable of error. It may be used in this sense either with or without the implication of personal identity.

(*c*) It may denote a subject capable only of some form or forms of consciousness, conceived to be perfect, and hence different from and better than any known to us.

Cf. MIND, SOUL, NOUS, PSYCHE, and PNEUMA.

II. (*a*) 'Spiritualism' is a less common synonym for Idealism, in the sense in which that word denotes the metaphysical doctrine that nothing but spirit exists. It generally implies both:

(1) That spirit exists only in the form of one or more spirits, i. e. involves personal identity; and

(2) That all spirit is perfect, and hence is of the nature specified above either under (*b*) or (*c*).

(*b*) SPIRITISM (q. v.).

In Plato and Aristotle the equivalents of 'spirit' are *νοῦς* and *ψυχή*. *Νοῦς* denotes reason, or its subject, conceived as incapable of error, and does not imply personal identity. *Ψυχή* in Plato denotes the subject of consciousness, in the widest sense; but is conceived, when free from the body, to possess no faculty but *νοῦς*. Aristotle appears to include under the word the lower forms of life also, without definitely implying that consciousness is necessary to them. *Ψυχή* generally involves personal identity. The first appearance of *πνεῦμα* (of which the Latin translation *spiritus* gives us our word) as a regular equivalent of spirit seems to be due to the Stoics. Through their curious identification of every kind of spiritual with some kind of material phenomenon, *πνεῦμα*, which properly means 'wind,' came to stand for the vehicle of spiritual activities; and since, among the early Stoics, the active principle, whatever form it might take, was regarded as always *really* reason (*λόγος* or *νοῦς*), the special association of *πνεῦμα* with reason naturally followed. Thus in Philo it definitely stands for *νοῦς*, as opposed to the lower psychical functions, although among some of the later Stoics *πνεῦμα* denotes these lower functions as opposed to *νοῦς*. The former usage prevailed, through its adoption in Christian terminology; and to Christianity, through the emphasis it threw on personal responsibility and immortality, is also due both the gradual inclusion of personal identity in the connotation of spirit, and the final reception of free will and some forms of emotion (as distinguished from the purely cognitive significance of *νοῦς*) among the higher or 'spiritual' forms of consciousness. In the last century there has been a tendency to revert to an impersonal conception of spirit, owing to the Kantian theory of a uniform contribution made by the mind to every object of knowledge. To make or to be this contribution seems to be very generally regarded as constituting the essence of spirit, its special relation to the subject of consciousness being very vaguely conceived. Spiritualism, which has come into use only in connection with the vogue given by the Kantian theory to the doctrine that everything is spiritual, frequently conveys this impersonal implication as to the nature of spirit. (G.E.M.)

Cf. also TERMINOLOGY, German, 'Seele and Geist,' and French, 'âme and esprit.'

In theology: the highest energy of a self-conscious being in the sphere of moral and religious knowledge and experience.

Spirit is conceived as an entity in religious thought, only when it is identified with the highest activity of self-conscious personality. In this sense perdurable individuality is predicated of it. The definition distinguishes spirit from soul, the highest activity of which is in the moral and religious sphere. Spirit is essentially a term of energy, and when applied to God involves the idea of divine energizing in the work of organizing and sustaining the higher manifestations of life. (A.T.O.)

Spiritism: Ger. *Spiritismus*; Fr. *spiritisme*; Ital. *spiritismo*. Belief that disembodied spirits exist and manifest themselves to men. Popularly called spiritualism.

The belief in the existence of miracles performed by unseen agencies is an ancient one, but the term spiritualism in its modern usage derives its importance from the manifestations which began in 1848 in the family of a Mrs. Fox, at Hydeville, N. Y., and from there quickly spread over the civilized world. Within a remarkably brief period spirit circles were established; journals and books on spiritualism were written and read; the

phenomena were enlarged and elaborated; investigations were instituted by scientific men; and the movement as a whole influenced, in an important way, the popular interest in and the conception of psychological topics. America and England remain the chief centres of spiritistic interest, although in France and Germany many believers in the doctrines of spiritism are to be found.

The earliest phenomena of spiritism assumed the form of raps or knockings, apparently of mysterious origin, but occurring only in the presence of the 'medium'; one knock was agreed to mean 'no,' and three knocks 'yes.' Questions could thus be asked and communications be established between the spirits and the living, through the 'medium.' Spirit circles consisted of gatherings of enthusiasts, often about a table, to whom, amid dim illumination and anxious expectation, such messages were revealed. The raps for 'yes' and 'no' were supplemented by using an alphabet and designating the letters; whereupon raps would occur at the desired letters, and more elaborate messages were spelt out. At this stage the influence of the studies of Animal Magnetism (q. v.) and Hypnosis (q. v.) reacted upon spiritualism, and developed a class of mediums who were put or put themselves into a Trance (q. v.) or sleep-waking state, in which they professed to be inspired by spirits and higher intelligences, and while thus inspired gave elaborate accounts of the spirit world. Entire volumes have been published purporting to be of such supernatural origin. (See Psychic Research.) There came from 'animal magnetism' the conception of 'clairvoyance'—the power to see at great distances and in spite of ordinary obstacles. Mediums went into a clairvoyant trance and reported upon doings at remote places as well as from beyond this sphere. In the hands of professional mediums the phenomena increased in number and complexity. Spirit lights were seen; quasi-human voices were heard; writing was produced without human intervention; spirit photography showed the spirit-forms hovering about their living relatives; in materialization séances ghostly forms appeared with the features of departed friends; some mediums were lifted or 'levitated' in air; solids were passed through solids; cords and bands were unfastened by unseen hands; messages were written upon slates carefully tied together and removed from human interference; tables were tilted; mysterious messages were written by the planchette; one's private and secret affairs were revealed by 'mediumistic' knowledge, and so on.

From a psychological point of view the phenomena fall into two classes. The one includes those which are mainly of physical origin, the alleged violation of physical laws. Essentially all of these phenomena have been reproduced by professional conjurers, while mediums have repeatedly been discovered in fraud in the production of their séances. Such phenomena illustrate the credulity of mankind, the absence of the critical faculty when the emotions and expectancy are involved, and emphasize the technical requirements necessary to discover such deception. The other group of phenomena involves some subconscious or automatic co-operation on the part of the subject. As in Muscle Reading (q. v.) and Automatic Writing (q. v.), so also in table turnings, in the use of the planchette, and in the production of the sympathetic atmosphere of the séance chamber, there is considerable unconscious co-operation and suggestion on the part of the subject, the precise nature of which has been more fully revealed by the experimental studies in hypnosis and Hysteria (q. v.).

So far as scientific investigations are concerned, it may be said that those which have been carefully conducted have served to indicate fraud, unconscious suggestion, and co-operation as sufficient explanations of what was presented; while the reported and more unusual phenomena failed to appear when rigid conditions were insisted upon. Although the philosophical doctrines connected with spiritualism occupy a secondary place in much of the literature of the subject, yet the anxiety to believe in and have evidence of an existence in a future life has been very influential in the propagation of the doctrine. To some, spiritism becomes a religious belief, and the material phenomena are of secondary importance.

Literature: Capron, Mod. Spiritualism (1855); R. Hare, Exper. Investigations of Spiritualistic Manifestations (1856); Binet, Alterations of Personality (Eng. trans.); A. R. Wallace, Miracles and Mod. Spiritualism (1876); D. D. Home, Lights and Shadows of Spiritualism (1877–8); Jastrow, Fact and Fable in Psychology (1900); Encyc. Brit. (9th ed.), Spiritualism; Rep. of the Seybert Comm. on Spiritualism; Morselli, Nuovo Misticismo in Psicologia (1896); Wundt, Der Spiritismus. (J.J.)

Spirits (in theology). The term in the plural is used either for disembodied souls or for beings like the angels, who are self-conscious personal beings without corporeality.

The belief in spirits is all but universal, and has been a feature of all but the most undeveloped religions. In Judaism and Christianity the spiritual world includes the Infinite Spirit of God and finite created spirits. This latter class is distinguishable into human and superhuman. The latter are good or bad spirits, angels or devils. All spirits are conceived to be immortal. (A.T.O.)

Spiritual (and **Carnal**) [Lat. *carnalis*, fleshly]: Ger. *geistlich und fleischlich*; Fr. *spirituel et charnel*; Ital. *spirituale e carnale*. To be spiritual is to have a consciousness that is active and responsive in the sphere of the higher moral and religious ideas and motives, while to be carnal is to lack insight and responsiveness in this sphere and to react only to ideas and motives of sense and materiality.

This being true, it is intelligible that the Scriptures should identify the carnal mind with death, the spiritual with true life. To the only life that is of worth in the spiritual world the carnal mind is without response and practically dead. (A.T.O.)

Spirituality: Ger. *Geistlichkeit*; Fr. *spiritualité*; Ital. *spiritualità*. A quality called also spiritual-mindedness, by virtue of which its possessor is delicately responsive to spiritual ideas and relations and finds the things of the spirit the things of supreme value. (A.T.O.)

Spirometer [Lat. *spirare*, to breathe, + Gr. *μέτρον*, a measure]: Ger. *Athemmesser*; Fr. *spiromètre*; Ital. *spirometro*. An apparatus used to measure lung capacity in terms of the amount of air expelled from the lungs after the utmost inhalation. (J.M.B.)

Splanchnopleure (in embryology) [Gr. *σπλάγχνα*, viscera, + *πλευρά*, wall]: Ger. *Splanchnopleura*; Fr. *splanchnopleure*; Ital. *splancnopleura*. The primitive wall of the digestive canal formed by the union of the endoderm with the inner or splanchnic leaf of the mesoderm.

The term was introduced by Michael Foster in 1875. It is often used incorrectly in Germany to designate the splanchnic mesoderm.

Literature: Foster and Balfour, Elements of Embryol.; F. M. Balfour, Compar. Embryol. (1881); Minot, Human Embryol.; Haeckel, Anthropogenie, 5th ed. (C.S.M.)

Spongioblast [Gr. *σπογγίον*, a little sponge, + *βλαστός*, a germ]: Ger. *Spongioblast*; Fr. *spongioblaste*; Ital. *spongioblasto*. An undifferentiated cell of the framework of the central nervous system; an immature spongiocyte. Cf. Neuroglia, and Nervous System (Histology).

Most writers agree with His that the spongioblasts and the neuroblasts can be distinguished from each other from a very early period, perhaps even before the completion of the medullary tube. The most recent writers, however, assign the differentiation of the spongioblasts and neuroblasts to a later period of development, affirming that both may be derived from an indifferent type of cell.

Literature: W. His, Abhandl. d. k. sächs. Gesell. d. Wiss., xv (1889); and Arch. f. Anat. u. Physiol., Suppl. (1890); A. Schaper, Arch. f. Entwicklungsmech., v. H. 1; and Morphol. Jahrb., xxi (1897); S. Paton, Johns Hopkins Hosp. Rep., ix (1900); S. Hatai, J. of Compar. Neurol., xi (1901). (H.H.)

Spontaneity [Lat. *sponte*, voluntarily]: Ger. *Spontaneität*; Fr. *spontanéité*; Ital. *spontaneità*. (1) A type of activity in which inner or immanent elements predominate.

Spontaneity is a conception relative to transeunt or mechanical causation, on the one side, and Self-activity (q. v.) on the other. The adjective spontaneous is applied to functions which are relatively independent of external stimulation or causation, as 'spontaneous sympathy,' and yet are not Reflective (q. v.). Cf. also Organic (in psychology).

(2) In Kant: see Receptivity.

(3) Cf. Eisler, *Wörterb. d. philos. Begriffe*, 'Spontaneität.' (J.M.B.)

Spontaneous: see Spontaneity, and Organic (in psychology).

Spontaneous Generation: Ger. *Urzeugung*; Fr. *génération spontanée*; Ital. *generazione spontanea*. Abiogenesis (q. v.): the production of living beings, not springing from pre-existing living beings.

The occurrence of spontaneous generation under any known circumstances is now almost universally denied. The belief in it, founded chiefly on the appearance of moulds and putrefying organisms in apparently well-closed vessels, was once widespread, and even as late as 1870–80 had defenders among scientific men. It is now demonstrated that the experiments, upon which the belief was based, did not exclude sources of error, and

that when these sources of error have been excluded, no evidence in favour of abiogenesis can be obtained. Under the old form of experiments, germs were not shut off from entering; when the entry from outside is prevented, no life appears in any medium heretofore experimented with. (C.S.M.)

Spontaneous (or **Fortuitous**, or **Accidental**) **Variation**: see VARIATION (in biology).

Spore [Gr. *σπορά*, seed, offspring]: Ger. *Spore*, *Keim*, *Keimspore*; Fr. *spore*; Ital. *spora*. Small cells, usually produced in considerable numbers by fission of a single cell, each small cell to serve for development into a new individual.

Spores are of frequent occurrence among flowerless plants, but among animals are to be found only in a few Protozoa, e. g. sporozoas. Cf. AGAMOGENESIS. (C.S.M.)

Sport (in biology) [prob. abbrev. of *disport*]: the English term is in use in the other languages. A variation departing widely in any direction from the average, but still following the principles of heredity and classification.

The term is due to Francis Galton. Terms of similar connotation are freak, which applies to variations out of the range of classification with other variations, yet not abnormal from defect; MONSTER (q. v.), variation which is abnormal, or much malformed. A man seven feet tall is a sport; a man with eyes of different colours would be a freak; the Siamese twins were monsters. Further, a prodigy is a variation in the direction of the exaggeration of some one character or faculty, resulting in great excellence. (J.M.B.)

Spurious Proposition: foreign equivalents are not in use. (1) A proposition which from the constitution of the universe must be true (De Morgan, *Syllabus of Logic*, § 76).

(2) B. I. Gilman (*Johns Hopkins Univ. Circ.*, August, 1882) calls the conclusion from two particular premises *spurious in the first degree*. Thus,

Some A is B,
Some C is not B,
$\therefore$ Some A is not some C.

This asserts the existence of an A and of a C, and further, that the number of the aggregate of the A's and C's is at least two. The conclusion from two premises, of which one is particular and the other spurious in the first degree, gives a conclusion spurious in the second degree. There are also anti-spurious propositions, which are the precise denials of spurious propositions of the same degree. (C.S.P.)

Square (of opposition): see OPPOSITION (in logic).

St. Augustine: see AUGUSTINE, SAINT, AUGUSTINIANISM, and PATRISTIC PHILOSOPHY (6, *b*).

St. Thomas (philosophy of) (1) and (2) **Roman Catholic Theology.**

I. *St. Thomas.* (1) The purpose of the philosophy of St. Thomas, called the 'Angelic Doctor,' and 'Angel of the Schools,' as indeed of all mediaeval endeavour, was to effect a conciliatory union between the truths of reason and the doctrines of Christian faith. This purpose, more or less explicit in Christian thinking from the days of the Alexandrian school of Origen and Clement, became a matter of prime necessity and interest in the complex thought-conditions of the 13th century, of which St. Thomas is so largely a product. The introduction of the complete works of Aristotle into Latin Europe, through the instrumentality of the Arabs, about the year 1200, and the direct Graeco-Latin versions of the Aristotelic writings subsequently made, with a view to discover what warrant there was for the extravagant interpretations put upon the Stagyrite by the Arabs, broadened the Latin mind considerably and placed Aristotle in the foreground as a source of knowledge. Upon one of these direct versions—that of William of Moerbeke, which appeared in 1263—St. Thomas based his commentary of Aristotle. Although in the nature of events Aristotle thus entered largely as an instrumental factor in the organic body of knowledge which St. Thomas reconstructed, the attitude of the latter towards the former, while sympathetic throughout with the method, and for the most part also with the views of the Stagyrite, was the attitude of a critic, not that of a slavish copyist, as an examination of the texts or a perusal of the list of Aristotelic errors abundantly discloses (Talamo, *L'Aristotelismo della Scolastica*, Pt. II. chap. ii–v. 151–206, 3rd ed., Siena, 1881). Plato and the Neo-Platonists, especially Dionysius Areopagita, were less extensively represented in the Thomistic synthesis, their representation being confined to a few points in theodicy and aesthetics. The Fathers, both Latin and Greek, notably St. Augustine, and the Arabs and Jews of the middle ages, notably Averroes and Maimonides, were drawn upon as philosophical sources while the Scriptures, together

with the writings of the same fathers and the conciliary teachings of the Church, furnished the theological matter for elaboration. Thus, on its material side, the philosophy of St. Thomas represents the absorption of the materials of ancient and contemporary culture into the body of a new scientific life.

(2) The rational side of the Thomistic synthesis was devoted to the problem of the dividing lines between philosophy and theology, which had to be determined with theoretical and practical precision. The distinctive dogmas of Christianity, such as the Trinity, Incarnation, and Sacraments, were carried over into the domain of purely *revealed* theology, the truth of which reason could not demonstrate scientifically, but only support by analogies and hypothetic arguments of fitness drawn from nature. The office of the theologian, therefore, is simply to show that reasons adduced against these higher dogmatic truths are either false or inconclusive. The immortality of the soul, the existence and attributes of God, were retained within the sphere of rational demonstration, which was akin with the *natural* theology of Aristotle. The criterion of philosophy was evidence, that of revealed theology was authority; which is accordingly the weakest source for reason, but the strongest one for faith. Philosophy and theology are distinct in object, principles, and mode of procedure (*Summa c. Gent.*, Lib. II. cap. 4), but yet related as completive parts each to the other.

The Latin Averroism of Siger of Brabant, who introduced the Arabic idea of the twofold nature of truth about 1266—namely, that a proposition demonstrably true for reason, such as the oneness of the intellect and the eternity of the world, might be equally false for faith—must be reckoned an indirect factor in the development of the rational side of the Thomistic synthesis. Against it St. Thomas urged the essential harmony of all truth, whether natural or revealed, conceiving the respective spheres of faith and reason, grace and nature, miracle and natural law, Church and state, as additions to, and complements of, each other, not contradictions. These respective spheres are but different stages in the realization of a single divine purpose. They but indicate the self-existent acting on a higher plane and working out one and the same eternal world-plan by means of a superior parallel order of phenomena. *Gratia non tollit, sed perficit naturam.* The supernatural does not destroy, it completes the natural. In carrying out this idea, which is the soul of all his endeavour, he united the teleology of history developed by the Fathers with the teleology of nature developed by the Greeks, and thus completed, as Windelband says (*Hist. of Philos.*, Pt. II. chap. ii. 327, Eng. trans., 1895), 'the most deeply and widely reaching union of the ancient and Christian conceptions of the world that has ever been attempted.' The following paragraphs present some of the details interwoven in this synthetic scheme. (The best complete edition of his works is the Parma edition, 1852 ff. Werner, *Der heilige Thomas von Aquino*, 3 vols., Regensburg, 1859, is exhaustive. On Averroism, see Renan, *Averroès et l'Averroïsme*, Paris, 1862–5; also Mandonnet, *Siger de Brabant et l'Averroïsme latin au xiii^me^ siècle*, 1899. *Das Verhältniss des Th. v. Aquino zum Judenthum und zur jüdischen Litteratur*, by Guttmann, is a study of Thomistic sources. C. Jourdain, *La philos. de St. Thomas d'Aquin*, Paris, 1858, gives an excellent account of the Thomistic philosophy, its source and method.)

(3) All knowledge starts with sensation: there are no innate ideas. The singular object is apprehended as such through sense; while the intellect, abstracting from all singularity, grasps it as a nature or essence. The result of this first abstraction is a direct universal. By comparison of several objects thus abstractly apprehended, the intellect detects the recurrence of a common element in all, and proceeds to rethink this common element according to the relation of universality disclosed to reflex thought. The result is a reflex universal, a *secunda intentio*, which as such is a pure creature of the mind, yet not without foundation in, and objective reference to, the individual objects from which it is drawn. The individual alone exists as a complete thing, and the real similarity of individual things is the ground of the universal. Considered with regard to God, who is essential thought-life, the universal is real with the reality of the divine ideas which are the causative prototypes of things. He thus placed the solution of the universals on an empirical basis, although adopting the threefold existence of the universal excogitated by Averroes (*De Universal.*, opusc. 50, tom. 28, Parma ed., 1875; *Summa contra Gent.*, Lib. I. cap. 65; Talamo, op. cit., 393, 398; Janet et Séailles, *Hist. de la Philos.*, 510–2).

(4) Metaphysics is the science of real being as such. Being is either real or mental, according as it signifies one of the ten cate-

gories, or the mere truth of a proposition (negations, privations, &c., which have no essence). Real being is composed of essence (what is contained in the definition, i. e. specific constituents, or real capacity to exist) and existence (act of essence, fulfilment of the capacity to exist). Essence and existence (*esse*) bear to each other the relation of capacity (*potentia*) to fulfilment (*actus*), and are thus really, though inadequately, distinct. Existence (*esse, existentia*), which also signifies the copula of a proposition (*ens rationis*) and an essence (*ens possibile*), is in its *real* acceptation the *act* of essence, viz. *that by which* a thing is posited outside its causes in the field of nature. Being (*ens*, the complete subject which is) is resolvable therefore into the two incomplete concepts of essence and existence. And hence real being may be described as 'that which has (*ens actuale*), or may have (*ens possibile*), existence.'

The transcendental notions (one, true, good) are only the relations of undividedness (*unum*), desirability (*bonum*), and conformity with some intelligence (*verum*) added to being. Transcendental truth is the very entity of a thing, viewed primarily as in actual conformity with its prototype in the divine creative mind, and secondarily as capable of effecting a conformity between the human mind and itself.

As the notion of being is the product of the highest analytic abstraction, it represents objectively a minimum content and a maximum extent. It is an indeterminate concept expressive of all things *implicitly* and of nothing *explicitly*, neither God nor thing, neither substance nor accident. To being as such no real object corresponded, since nothing can merely be, without being determinate, qualified, individual. Being, therefore, does not signify an objective content either wholly the same (*univocum*) in all of which it is predicated, or wholly divergent (*aequivocum*); neither does it point to universal identity (*identicum*); it merely expresses the proportional agreement (*analogum*) of all things, including God, in the fact that all really are *subjects existing*, howsoever divergent, even infinitely, such subjects may chance to be. The objective content of being is invariable in expressing this fact: it varies in each case in accord with the nature of the subject that is said to be. To view being therefore as the concept of the infinite, is to confound the abstract order with the concrete, as the Neo-Platonists did, or to fall into the error of Pantheism. This theory of being, supplemented by the Aristotelic division of causes and the idea of 'matter and form,' was his point of leverage against Pantheism and the constructive basis for his conception of God (St. Thomas, *Opusc. de ente et essentia*, cap. 1, 6; *Metaphys.*, Lib. IV. lect. 1; *Contra Gent.*, Lib. I. cap. 31–4; *Summa Theol.*, Pt. I. quaest. 13, art. 5, 6; *Quaest. Disp. de Potentia*, quaest. 7, art. 7; *Quodlibet*, 9, art. 3. Cf. also Prisco, 'La Metafisica di San Tommaso,' in *L'Accademia Romana*, iii. 451–75, 1883; iv. 191–245, 1884).

(5) Cognition was explained as the representative presence (*species intentionalis*) of the thing known within the knower. This theory of the 'species' was not that of an efflux from objects, as Hauréau wrongly states and as St. Thomas himself distinctly repudiates (*Quaest. Disp. de Verit.*, quaest. 2, art. 5, ad. 15). The 'species' was the result of the action of the object (*species sensibilis impressa*) and the reaction of the subject (*species sensibilis expressa*); and the conscious state aroused by this representation of the object was called a 'species intentionalis,' to show that there was a genuine relation of similarity between the mental reproductions and the extra-mental objects, although both differed *toto coelo* in nature. The 'species' was therefore no fictitious entity midway between subject knowing and object known.

The keynote to Thomistic metaphysical psychology is the essential distinction between a lower or sensuous, and a higher or rational, grade of consciousness. The essential irreducibility of attention, abstraction, comparison, reasoning, self-consciousness, and free will to organic processes, such as those of the external senses, the imagination and the sensuous memory, is the ground of spirituality and immortality. The latter phenomena are accounted for by admitting the co-operation of the soul or vital principle with the organic co-factor; the former demand intrinsic independence of the organism for their display, and hence point to an inorganic principle as their exclusive subject. Thought is not a passive transformation of sensations; an inner attentive energy of the mind (*intellectus agens*) disengages at first the essentials of the sensuous presentation (*abstrahit essentiam*), and then the mind itself (*intellectus passivus*), out of this prepared datum, proceeds to generate the pure forms of thought (*exprimere intelligendo*). This was an application of the Aristotelic theory of the 'active and passive intellect' to the problem of the bridge between

sensation and conception. The intellect is acknowledged to be objectively dependent on sense for the acquisition of the materials of its knowledge: it is subjectively independent of the organism, however, in the display of its irreducible activities of thought and volition. This intrinsic independence of the organism which the soul shows (even while united with the body and conditioned by the health or disease of the imagination and memory) by the very fact of its being the exclusive subject of its own higher functions, is the proof of spirituality and the pledge of immortality. This view of St. Thomas does not imply an 'anima separata,' but an 'anima separabilis.' There is only one *specific* substance in man—the compound self or ego. The soul was not a mere thinking machine, but the life-giving principle of the body as well, discharging the several functions of thought, feeling, and volition, either by itself or conjointly with the organism, as above stated (St. Thomas, *Summa Theol.*, Pt. I. quaest. 75–90, especially 79; *Quaest. Disp. de Anima*, I. art. 1, 2, 4, 10; *De Anima*, Lib. III. lect. 7; *Opusc. de natura verbi intellectus*. Cf. also Werner, *Der heilige Thomas von Aquino*, ii. 432–58, Regensburg, 1859; Liberatore, *Die Erkenntnisslehre des heiligen Thomas von Aquino*, übersetzt von E. Franz, Mainz, 1861).

(6) The idea of God is not innate, but the result of demonstration, the proofs being reduced to five in the second question of the *Summa* (art. 2). The burden of these proofs is to show that the idea of God is to be framed by the elimination of all capacity for development (*potentialitas*), which is the essential feature of created reality, and by the conception of a pure actuality, essentially undevelopable, possessing all perfection, and subject to none of the existential, spatial, temporal, or causal limitations proper to the finite. The methods which he employs are two: analogy and negation. On the principle of analogy, i.e. the proportional similarity between the *being* of creatures and the *being* of God (see above, 4), the perfections discovered in things are affirmed of God, the prime source of all reality. The method of negation acts as a corrective. As God is self-existent Being (*ens per essentiam*) and creatures derivative being (*ens ab alio*), the imperfections of the latter, both as to substance and mode, must be denied of God, whatever perfection is affirmed being affirmed in an eminent way. Thus inquiry into things gives us the idea that they are causally derived, and further inquiry into the nature of this causality abuts on the idea of an uncaused first cause. The nature of this first cause is set forth by means of the comparative analysis, just indicated, of essential and derivative being. God is simple, infinite, omnipresent, immutable, eternal, one: he is infinite knowledge, power, and will, creator, upholder, and provider, the efficient source of all being and the final destiny of man. Creation is the production of a thing in its entirety out of no pre-existent material by the sole power of the Self-existent acting according to a plan. The *possibility* of an eternal creation is an open question: the *fact* of the world's creation in time a matter of faith. God is *in* the world, though not *of* it, creating each human soul according as conditions demand, and working in all men and things as the purposeful and efficient universal cause. In this wise the Aristotelic, Platonic, Neo-Platonic, Patristic, and scriptural elements were interwoven in his synthetic conception of the Deity (St. Thomas, *Summa Theol.*, Pt. I. quaest. 1–26; *Contra Gent.*, Lib. I, II. On question of eternal creation see *Opusc. de aeternitate mundi contra murmurantes*; also, in Lib. II, *Sentent.*, dist. 1, quaest. 1, art. 5; *Summa Theol.*, Pt. I. quaest. 46, art. 1, 2; Talamo, op. cit., 151–60).

(7) The ethical view of St. Thomas, grounded on the idea of God as the final destiny of man and the true end of deliberative human conduct, is nought else than the morals of mankind in history chastened and systematized in the light of Christian principles. His synthesis avoids the extremes of idealism and utilitarianism, and is accompanied by minute analyses of the passions, the proposal of counter virtues, and the detailing of the duties of bishops, citizens, rulers, and individuals. With him, ethics is the science of the means which lead to the end of human conduct. Moral welfare is not measured by any temporal good, but by the final possession of the essential good, God. The objective spring of action is disinterested love of the good and hatred of evil; the subjective springs are hope of reward and fear of punishment. The moral goodness of human action is determined by the conformity of the latter with right reason; conscience being the expression and application of this conformity. This proximate subjective criterion of morality is referred to an objective ultimate criterion, viz. the divine reason, or eternal law, which is the real ground of all morality and the source of all

law, natural and positive. Morality, with St. Thomas, was not the result merely of a commanding will, as with Scotus; it consisted in the intrinsic relations which the objects of man's choice bear to the all-ordaining intelligence of God. The human will is therefore to some extent determined by the intellect, and freedom of choice is limited to various possibilities as means to an end, but does not extend to the end in itself, which is the good. The primary precept of the natural law is that good should be done and evil avoided.

The state is rooted in man's nature. Social authority exists by natural right, and is to be employed for the common weal. The state is not an end in itself, but only a means to procure the temporal welfare of its citizens. The best form of government, theoretically, is the monarchical, tempered by an aristocracy and a democratic electorate (*Summa Theol.*, Pt. I. quaest. 105, art. 1). The Church has as its end the eternal destiny of the individual, and is therefore independent of, and superior to, the state, while both are but preparatory schools for the heavenly society of the blessed (*Summa Theol.*, 1^a, 2^{ae}, quaest. 91, art. 1; 93, art. 1, 2; 94, art. 2, 4; 105, art. 1; *De regimine principum*, Lib. I. cap. 15; Talamo, op. cit., 433–57; Contzen, *Zur Würdigung des Mittelalters*, &c., 24, Cassel, 1870; Baumann, *Die Staatslehre des heiligen Thomas*, &c., 7, Leipzig, 1873).

II. *Relation of the philosophy of St. Thomas to Catholic theology.* The vital principles of the Thomistic philosophy are still fundamental to Roman Catholic theology, such as the objectivity of thought, the essential distinction between sense and intellect, with its double consequence of a substantial spiritual principle or soul in man, and the immediate creation of each individual soul by the Omnipresent Infinite; the analogousness of being as opposed to Pantheistic identity; matter and form, at least as an ultimate metaphysical theory; the conception of God the Creator as *in* the world, though not *of* it, and the dependence of ethics on dogma. The synthetic view of St. Thomas, based upon the essential harmony and unity of the world-ground or God, and representing the supernatural order (faith, grace, Church, miracle) together with the natural (reason, nature, state, cosmic law) as a twofold realization of a single divine purpose, to be completed in the after-life for the spiritually fittest, is ever the ideal of Catholic theology. The Thomistic conception of the respective provinces and relations of philosophy and theology (see 2, above), as well as the Thomistic order of presenting the revealed truths, remain as a framework, although filled in more substantially. The encyclical *Aeterni Patris* on the restoration of Thomistic studies, while commending the analytico-synthetic spirit (*sapientia*) of St. Thomas, discountenances a return to subtle or unsubstantial scholastic views, and suggests the incorporation of the results of modern research into the Thomistic synthesis (*Encyc.*, paragraph 4 from end). For the Catholic who, through the Church, accepts the Scriptures as the inspired Word of God, the essential subordination of the finite to the infinite reason is a rational consequence following on the admission of the historical fact of revelation. In framing his scientific conception of the world, such a one must needs make room for supernature in his universal scheme, and look upon reason and the panorama of the visible as only a part, not the whole, of the divine economy. Of such a world-view, St. Thomas Aquinas is the type *par excellence*, and he has left a good transcript of himself as such in the *Summa Theologiae* (Pt. I. quaest. 1, art. 8, ad. 2). 'Thomism,' therefore, is not St. Thomas stereotyped in minutest detail: it is the acceptance of a definite world-view with the principles and methods that give it articulate and rejuvenescent expression. Thomism, however, must be disassociated from the respective theories of determinism and indifferentism which have mutually claimed the patronage of St. Thomas in the course of the Bannezian and Molinistic controversies on grace and predestination. Critical reconstruction (Pecci, *Accademia Romana di San Tommaso*, v. 99–145, 1885) has abundantly disestablished both these views attributed, without objective warrant, to the Angel of the Schools (Lesserteur, *Saint Thomas et le Thomisme*, Paris, 1883; Jourdain, op. cit., ii. 237 ff.). (E.T.S.)

Literature: see citations in the various sections above, also under Scholasticism, and Patristic Philosophy.

Stability (economic) [Lat. *stabilitas*, firmness]: Ger. *Stabilität*; Fr. *stabilité*; Ital. *stabilità*. (1) A condition of economic equilibrium, such that any disturbance produces a reaction that tends to bring matters back to the old adjustment. Cf. Supply and Demand, and Unstable Equilibrium.

(2) A continued absence of marked economic change, to whatever cause it may be due.

(3) A set of social conditions favourable to

survival in the competition between different institutions.

The first use is the distinctively modern one, but all are equally accredited in scientific as well as in popular usage. (A.T.H.)

Stage (in mental evolution): see GRADE, and cf. SUBCONSCIOUS.

Stammering [AS. *stamur*]: Ger. *Stammeln*; Fr. *bégaiement*; Ital. *balbuzie*. An impediment of speech-utterance which causes the speaker to hesitate, stop, drawl, or rapidly repeat a sound, usually an explosive consonant, at which the stoppage occurred; thus inclusive of STUTTERING (q.v.).

It includes, in a wider sense, difficulties in pronouncing certain letters, hesitating or stumbling utterance, the transposition of letters or syllables, utterance of meaningless interjections, &c., all of which interrupt the flow of speech.

Stammering (with stuttering in the special sense) generally appears in childhood (four or five to thirteen or fifteen years), and often undergoes a spontaneous improvement with advancing age. It is apt to occur in children of weak, nervous temperament. It varies in degree from a slight repetition of sounds to an intense paroxysm not only of the vocal mechanism, but of the entire body. It occurs much more frequently in men than in women. It is markedly subject to emotional influences. Worry, excitement, ill health aggravate it; while careful preparation, as in public utterance or the abandonment of alcoholic stimulation, may remove it. It is a notable fact that stuttering disappears in singing. The defect is a functional interference with the complicated mechanism of articulation, and consists particularly in a faulty co-ordination between the voice-producing and the sound-forming factors of utterance. See the references noted under STUTTERING. (J.J.)

Standard: see NORM.

Standard Stimulus: see NORMAL STIMULUS.

State (and **Condition**) [Lat. *status*, from *stare*, to stand]: Ger. *Zustand*, *Verhältniss*; Fr. *état*, *condition*; Ital. *stato*, *condizione*. Terms used loosely for quality, property, aspect, relationship, &c. Any descriptive predicate may indicate a thing's state or condition, e.g. from STATE OF CONSCIOUSNESS (q.v.) to STATE OF NATURE (q.v.). (J.M.B.)

State is a term used in such very different senses by different writers that it can hardly be said to have a generally acknowledged meaning. Some understand it properly to apply to an unalterable determination or property; but the majority, in accordance with its original meaning—a posture in standing—take it rather to imply, on the contrary, a temporary condition, although no doubt in some cases it refers to an enduring condition. It is usually understood to imply passivity, yet in some expressions its implication is the reverse. (C.S.P.)

State or **Community** (political): Ger. *Staat*, *Bürgerschaft*; Fr. *état*; Ital. *Stato*. A society, the members of which render habitual obedience to an authority within that society which does not render habitual obedience to any external authority.

Every permanent association must possess some organ of government to which its members render habitual obedience, at least, in matters coming within the scope of the association. Without such an organ of government the association would be impotent. This organ of government, again, must have a certain sphere of action within which it is free, otherwise it would be useless. Thus the existence of the family implies obedience of the children to the parents and a certain discretion left to the parents by society. What distinguishes a political community from other forms of association seems to be this, that the obedience which the ruler claims is indefinite in extent, and that the independence of the ruler is similarly indefinite. Thus a shareholder in a company is only bound to submit to the resolutions of the company in matters affecting his shares in its stock. The resolutions of the company are binding only in those matters with regard to which they have been authorized by law. It is true that the distinction is only one of degree. In some religious associations, e.g. the Catholic Church in the middle ages, the sphere of authority claimed by the ruling power has been at least as wide as that pertaining to the sovereign of a political community. The ruling power was at least as independent in the exercise of authority as any contemporary sovereign. In fact, an Englishman or Frenchman of the 12th century might be said to be a member of two distinct political communities—his native kingdom and the Catholic Church. Trading associations, again, have sometimes acquired powers which were strictly political, and have become *imperia in imperio*. On the other hand, political communities have differed very widely both as regards the scope of the ruler's authority and the degree of the ruler's inde-

pendence. The scope of the ruler's authority was one thing in a Greek city, another in a mediaeval kingdom, another in a centralized modern state. Similarly, the independence of the ruler varies indefinitely with circumstances. It is one thing in a fully sovereign state, another in a state which acknowledges a suzerain, another in a state which is a member of a federation, and so forth. But, on the whole, the political community is distinguished from other associations chiefly by (1) the indefinite extent of the obedience which the governing power may claim; (2) the indefinite extent of the independence which the governing power may enjoy.

Literature: ARISTOTLE, Politics; HOBBES, Leviathan; LOCKE, Civil Government; BENTHAM, Fragment on Government; AUSTIN, Jurisprudence; MAINE, Hist. of Inst., Lects. xii and xiii; BLUNTSCHLI, Theory of the State; SIDGWICK, Elements of Politics; BOSANQUET, Philos. Theory of the State. See also under STATE (philosophy of). (F.C.M.)

State (philosophy of): Ger. *Staatswissenschaft, Rechtslehre, Rechtsphilosophie* (see below); Fr. *philosophie sociale* (*de l'état, du droit, de l'histoire*); Ital. *filosofia del diritto* (or *politica*). The philosophy of the state treats of the life of man so far as it is a life in community. (B.B.–J.M.B.)

The *Republic* of Plato and the *Ethics* and *Politics* of Aristotle are the earliest examples. To this study, which he conceived as an inquiry into the good for man with a view to practice, Aristotle gave the name of 'politic' (πολιτική), a substantive in adjectival form analogous to those from which we derive such terms as music and dialectic, and capable of being understood as the name either of an art (τέχνη), or of a science (ἐπιστήμη), or of any kind of methodic study or pursuit (πραγμάτεια or μέθοδος). The meaning of the name 'politic' as the study of the good for man must not be narrowed by the contrast implied in the names of those of Aristotle's writings which are known as the *Nicomachean Ethics* and the *Politics*. 'Politic' is the object-matter of the *Ethics* no less than of the *Politics*, while the word ethic (ἠθική), like the word logic, is not to be found in Aristotle as a substantive, i.e. as the name of a distinct study (Burnet, *The Ethics of Aristotle*, xxvii).

In other words, Aristotle, like Plato, regarded the good for man as, in its nature, capable of realization only in a community of souls or selves, and did not think of separating the study of the good of the individual from the study of the good of the community. The *Ethics* and *Politics* treat respectively of the nature of this good and of the means of realizing it by legislation, but it is the same good, that of the social creature man, with which both treatises are dealing. The name 'politic,' due to the Greek πόλις or city being accepted as the ideal and therefore typical human society, may be objected to, it appears to Aristotle, because it does not sharply bring out the sameness of individual and social good. He does not suppose that it could be objected to for assuming such a sameness (Burnet, op. cit., Introd., § 14). Aristotle's 'politic' must have been rendered 'moral philosophy' in the source from which Shakespeare drew in *Troilus and Cressida*—'Not much Unlike young men, whom Aristotle thought Unfit to hear moral philosophy' (διὸ τῆς πολιτικῆς οὐκ ἐστὶν οἰκεῖος ἀκροατὴς ὁ νέος, *Eth. Nic.*, iii. 4, 5).

Turning to modern thought, it is natural to reserve the title 'philosophy of the state' for those forms of theory, whatever name they may adopt, which approach the phenomena of social life from the 'philosophical' point of view. We may say, perhaps, that philosophy is an attempt to see things in their relation to completeness or perfection; and the philosophical point of view, in considering the phenomena of the state, would then appear, in accordance with the example of Plato and Aristotle, to be concerned with the relation of the state, as a community of souls or selves, to the completeness or perfection of life. Owing to historical causes, much speculation that is substantially of this type has appeared in connection with the idea of social contract or of natural right. The political philosophy of Hobbes, Spinoza, Locke, and Rousseau might be ranked under the heading of Rechtslehre (theory of right) or Naturrecht (natural right), which is explicitly adopted by Kant and Fichte, and a multitude of minor writers, in Germany. The full title of Hegel's great work on the subject runs—*Grundlinien der Philosophie des Rechts, oder Naturrecht und Staatswissenschaft im Grundrisse* (Outlines of the Philosophy of Right, or Natural Right and the Science of the State in Outline). The German 'theory' or 'philosophy of right' corresponds to what an English thinker might describe as the theory or philosophy of law. But the former has a wider meaning, suggesting a science in which all forms of recognition of what ought to be, within a human society,

are brought into connection, and consideration is not restricted to the phenomena of positive law. It implies, therefore, a wider treatment than that of which Austin's *Jurisprudence* is an example. When J. S. Mill's *System of Political Economy* professes on its title-page to include 'applications to social philosophy,' we are probably to understand that it does not leave out of account the bearing of economic facts upon the completeness of human life. There are, however, two distinctions between Aristotle's 'politic' and the modern philosophy of the state.

(1) The practical aim which Aristotle claimed for his 'politic' is usually repudiated by modern political philosophy. Not that it holds theory to be idle or devoid of reaction upon human conduct, but that it conceives of philosophy mainly as an attempt to *understand* the forms of life; and these, before they can be completely understood, must be themselves fairly complete, and no longer 'in the making.' Aristotle's own relation to the Greek city might even be cited as a striking confirmation of this modern point of view.

(2) In face of the literature of ethical science in modern times it would be a paradox to maintain that the philosophy of the state, like Aristotle's 'politic,' is identical with, or even includes the science of ethics or moral philosophy. Nevertheless, its tendency to do so is plainly traceable, for example, in Hegel, who has no specific treatment of ethics outside the philosophy of the state. And the emphatically isolated treatment of moral philosophy, as inherited by the modern world from the Stoics, and pursued by the English schools and by Kant, will be found as a rule to indicate a fundamental difference of philosophical principles as against that phase of idealism which has laid most stress on the philosophy of the state.

A modern form of thought (though anticipated by Books VIII and IX of Plato's *Republic*), which is, in fact, an application of the philosophy of the state as here understood, is the philosophy of history (Philosophie der Geschichte). It endeavours to see, in the succession of social forms in time, that relation to completeness of life which the philosophy of the state attempts to analyse in its general principles and in typical examples. Kant has thus summarized its conception in a single sentence: 'We may regard the history of the human race on the large scale as the accomplishment of a latent plan of nature, to bring to pass a political constitution which is inwardly, and to this end also outwardly, perfect, as being the only condition in which she can fully develop all the capabilities which she has implanted in humanity' (Kant, *Werke*, vii. 329, Rosenkranz, *Idee zu einer allgemeinen Geschichte in weltbürgerlicher Absicht*, which is included under the general heading *Zur Philosophie der Geschichte*). It therefore aims at a combination of the rational and historical, which, as Kant says (ibid., 332), sounds more likely to produce a fiction than a history (Aristotle, we remember, has said that poetry is more philosophical than history). Thus Schelling at one time held that a philosophy of history was a contradiction in terms (*Werke*, i. 466). If, however, the possibility of a philosophy of the state is admitted, the possibility of a philosophy of history can hardly be denied.

The philosophy of the state has further to define its position in regard to (1) its difference from, and (2) its affinity with, modern SOCIOLOGY (q. v.). This name is due to Comte, and is employed to-day by writers in all the great European languages. For Comte it was equivalent to social physics, a significant term; and the more general expression social science (science sociale), originated, it would seem, by the French economists of the later 18th century, is widely used to much the same effect (J. D. Rogers, in *Dict. of Polit. Econ.*, 'Social Science,' who points out that, as in Vico's *Scienza Nuova* and Comte's *Sociologie*, the conception of a science of society has repeatedly been claimed as a new departure in modern Europe). (1) Its difference from the philosophy of the state consists in this, that sociology has been faithful to the 'positive' point of view from which Comte initiated it. It has been conceived as a distinctively modern science, on the analogy of the natural sciences, and greatly influenced by biological analogies and considerations, especially, of course, by the ideas which pass under the name of Darwinism. Sociology, then, in its inception and intention, is a natural science. 'It is an interpretation of human society in terms of natural causation, . . . (it) is an attempt to account for the origin, growth, structure, and activities of society by the operation of physical, vital, and psychical causes, working together in a process of evolution' (Giddings, *Princ. of Sociol.*, 1896, 7, 8).

So far, sociology seems to begin at the other end from the philosophy of the state. The philosophy of the state is 'critical' through-

out, in the sense in which philosophy makes use of that term. Its leading idea is the estimate of degrees of completeness, degrees of self-expression, degrees of harmonious life. Historical and economic explanations, laws and causes of progress and decadence, are not as such its primary problems. It asks about the state what other forms of philosophy would ask about science or fine art or religion, viz. how far are they respectively examples of a perfect or harmonious experience, and if not themselves examples of it, how far they throw light on what such an experience would be? Nevertheless, it is plainly impossible to judge of the completeness of any form of life without understanding what it is and how it works; and therefore there is probably no province or result of sociological research which does not aid in vitalizing and enriching the philosophy of the state.

And (2) in recent years a closer affinity between the two has revealed itself. Even when sociology was mainly guided by biological analogies, a curious double tendency was noticeable in their bearing (see H. Spencer, *Sociology*, i. 586). If the theory of the struggle for life between individuals pointed to an atomism in a flat contradiction with philosophical conceptions of the state, yet, on the other hand, the analogy of an individual living body, which had attracted the attention of ancient thinkers, was still influential in pointing to a unity which should be more than mechanical. And when, by the mere force of facts, sociology repudiated its founder Comte's rejection of psychology, and was compelled to postulate some kind of mental unity as the focus of social phenomena, the difference which held it apart from the philosophy of the state bade fair to be done away. When we find the sociologist basing his science on such conceptions as the mind of a crowd (Le Bon), 'imitation' and 'social logic' (Tarde), or 'the consciousness of kind' (Giddings), we are inclined to conclude that no difference remains between sociology and the philosophy of the state. The mind or the self (Baldwin) has become for both alike the centre in which alone the facts of social life can attain to full intelligibility. (Notably this point has been brought out by M. Tarde with reference to social statistics, *Les Lois de l'Imitation*, 115.)

In becoming a science of mind, then, sociology seems to have blended with the philosophy of the state. But yet a difference remains. Sociology has still before it the ideal, not indeed of a physical, but of a natural science; and it joins hands with psychology in the sense in which psychology shares this ideal—as an impartial science, whose watchwords are law, process, and genesis, and which is indifferent to the distinction between higher and lower forms of life (see Stout, *Analytic Psychol.*, Introd.).

The modern philosophy of the state, as we found it, for example, in Hegel's *Philosophy of Right*, may best be understood by regarding it as the theory of Plato's *Republic* expanded and differentiated in accordance with the deeper individuation and fuller integration of a modern community.

Plato's state, as outlined in the *Republic*, presents to a modern eye the appearance of what he calls, in another sense, a 'minimum community' (*ἀναγκαιοτάτη πόλις*)—a community reduced to bare essentials. For this there are many reasons, which cannot be entered upon here. But, whatever Plato's intention may have been, for us his work serves the purpose of a diagrammatic representation of a state. A true community, he seems to tell us, must be above all things a single spiritual system, and further, a single system presenting three aspects at the least, viz. intelligence to guide itself, resolution to defend itself, and the desires and capacities which underlie all bodily living, to maintain itself. Pressing home the inquiry into these indispensable attributes, he shows us that in every soul or self there is some spark of all of them, but that in the community as a working system they are represented by great organs or institutions, the 'classes,' as he calls them, in which the several souls combine according to the predominant gifts of each—the statesman, the knight, and the trader or man of industry—to render their specific service to the whole. And as all action springs from the mind, while the mind becomes a definite system only in action, it follows that every soul or self in the community is a microcosm of which the state or community is the macrocosm, or that the whole visible community is the body of which a whole connected system of spiritual qualities is the soul. Thus the organization and harmony of the state at once expresses, and guarantees by expressing, the organization and harmony of the soul, for unfulfilled or undisciplined capacities in the latter imply waste and friction in the former. And, therefore, the order of the state may be portrayed as a system of moral excellences, wisdom, courage, temperance, and justice, which must all (if we press the matter home)

be in some degree present in the inmost structure of every self, as a unity of reason, spiritedness, and desire; but each of which will be more especially the predominant characteristic of a certain class or organ of the commonwealth—wisdom of the statesman, disciplined courage of the knights, temperance as a right relation between rulers and ruled, and, we must suppose, as an attribute of the traders and the workmen, being a right activity with regard to bodily necessaries. And the unity and harmony of the whole community, and that inner unity and harmony of the individual mind which is at once its reality and its reflection, may be doubly described as justice, or an autonomous discharge of duty by every member, and as love, or the sentiment of a natural kinship; the feeling, as it were, of a single enormous family.

In this diagrammatic representation, simplified to the very minimum conceivable as a society, or perhaps beyond it, we miss nearly all of the elements which form the interest and difficulty of a modern state. The vast complex of institutions and corporations which now seem to stand between the individual and the state, each in itself a whole world of feeling and tradition, such as the churches, the universities, the great organized professions, and the machinery of representative government, and, again, the family and the world of private enterprise and commerce and industry, Plato in part had never met with, and in part had struck out of his diagram.

Hegel has boldly included the family and the world of economic competition as natural and necessary institutions, resting on natural and necessary aspects of mind, within the great totality or ruling idea of the state. The differentiation is immeasurably more subtle, and the opening for self-contradiction within the system is wider, than Plato's diagram admitted; but the principle is the same as that according to which, for example, Plato found the true characteristic development of individual spiritedness in the courage which is the knightly temper of a disciplined patriot soldiery. Just so, the natural affections, for Hegel, find their proper outlet in the family, and at the same time are tamed within it into certain necessary phases of the true citizen temper, and spread a spirit of kinship throughout the entire community.

And in the same way the 'bourgeois society' (bürgerliche Gesellschaft), which is his name for the community when regarded from the point of view of the classical political economy, stands for a necessary aspect of the complex modern spirit, the aspect in which the particular self takes shape under the severe discipline of the competitive world, operating through its private interests, and not by external despotism, as a unique service-rendering individual member of the universal social mind. Thus the complexity and expansion of modern institutions involves a correlative complexity and intension of the individual consciousness, which for the modern theorist, as for Plato, is a focus or mirror of the whole as it were from a particular angle and in a particular perspective. Every institution or social organ may thus be regarded as an ethical idea, and the state, or the working adjustment and supreme criticism of them all, as the system or totality implied, however inadequately realized, in the relative unity of every individual consciousness. The philosophy of the state is for Hegel a chapter in the philosophy of mind.

This is the key to the meaning of such phrases as the social self, or the real or general will, made current by Rousseau and his descendants on the German side. It is in the development and organization of capacities which come through the social order that the particular human being finds a clue to the way in which he can make the most of himself. The mind present in society, in its relation with a given undeveloped self, may be compared to a far-reaching theory in its relation with an isolated sense-perception about the same subject-matter. The self finds its real meaning in the social mind, as the sense-perception finds its real meaning in the completed theory. In both cases the absorption involves a transformation. That which we now really aim at, and are demanding to become, is something which we should not recognize if we now saw it in a completed form. Just so, to use a hackneyed illustration, the sense-perception that this apple falls to the ground is not recognized by the untrained mind when transformed into the Newtonian theory of gravitation. The social self, then, or real or general will, is that which, if we completely had it, would be a satisfactory development of our nature. Any approach to it, therefore, such as the relative expansion and organization which an actual society secures for our self, is so far a categorical imperative as against our half-developed personality.

Here, then, is the inherent principle and

limit of state coercion. In essence, such coercion is the reaction of the awakened on the unawakened self through the only means which are palpable to the latter. Its limit arises necessarily from the fact that the direct appeal to the unawakened self, or the self which falls asleep in a routine—an appeal not only through the menace of force, but through very various forms of custom, tradition, and the influence of prestige—may readily have the effect of throwing into the sphere of automatic habit or mere submissiveness concerns which demand the best energies of the awakened mind. The aim, therefore, is plainly to effect the right demarcation between the sphere of the fully awakened and that of the drowsy or routine-loving, or even incompetent and potentially rebellious, self.

The sphere of the latter will always be by far the larger in magnitude; for routine is the very machinery of existence. The work of social skill is to shape the submissive automatic life so that it may sustain, without encroaching upon, the energies of the fully awakened and progressive intelligence and affections.

It should be borne in mind that all first-rate work in archaeology, the theory of religion, political economy, and other definite branches of social research (e.g. the history and theory of charity), not to mention that mixture of narrative and judgment which is called 'history' *par excellence*, treats in a profound sense of human life in communities, and very often with a far more direct insight and more thorough and successful grasp than abstract social theory, which is plagued with general analogies and attention to prehistoric problems. A people, ancient or modern, should be studied as a whole like a living creature, from its food and habitat up to its instincts and ideas, as, for example, ancient Greece has been studied. From this point of view the methods of Le Play have typical importance.

Literature: an important source of the philosophy of the state must always be the Republic of PLATO, and the Nicomachean Ethics, with the Politics, of ARISTOTLE. The earlier modern history of the subject is closely bound up with the theory of the Law of Nature, Natural Right, and the Social Contract as treated by SPINOZA, HOBBES, LOCKE, and ROUSSEAU; for the reason and nature of this connection see MAINE, Ancient Law; RITCHIE, Natural Rights; and T. H. GREEN, Princ. of Polit. Obligation. From Rousseau the tradition passes, gathering up elements drawn from VICO and MONTESQUIEU'S conception of the spirit of a people, to HERDER, KANT, and their successors; see LEVY-BRÜHL, De l'Influence de J.-J. Rousseau en Allemagne, Ann. de l'École libre des Sciences Politiques, Juillet, 1897. For Kant's views, see his Werke (Rosenkranz), vii. 315, Zur Philos. d. Gesch., including a criticism of Herder's ideas, and ix. 1, Rechtslehre. FICHTE'S main writings on the subject are Werke, iii. 1, Grundlage des Naturrechts (1796, earlier than Kant's Rechtslehre), and ibid. 389, Der geschlossene Handelsstaat (1800), perhaps the first document of definite Socialism in Germany, and Nachgelassene Werke, ii. 495, Syst. d. Rechtslehre (delivered as lectures at Berlin in 1812). For SCHELLING, see his Neue Deduction d. Naturrechts, Werke, Abth. 1, i. 245, and Abhandl. ü. d. Frage ob eine Philos. d. Gesch. möglich sei, ibid. 461. HEGEL'S Rechtsphilosophie (published 1820) and Philos. d. Gesch., delivered as lectures, 1822 and later, should be compared with Philos. des Geistes (part of the Encyclopedia), published 1817 (trans. Wallace, 1894, with Introduction), where a sketch of the Philosophy of Right appears as the chapter on 'Objective Mind.' Note also HEGEL'S Krit. d. deutschen Verfassung and Syst. d. Sittlichkeit, written 1802 (see Wallace, op. cit., clxxx). In recent literature have appeared T. H. GREEN, Princ. of Polit. Obligation; RITCHIE, Nat. Rights; MACKENZIE, Introd. to Social Philos.; BOSANQUET, Philos. of the State; NEWMAN, Politics of Aristotle, i. Introd. Note also WALLACE, Introduction to his translation of Hegel's Philosophy of Mind (see above), and the same author's posthumous Lectures and Essays on Nat. Theol. and Ethics, containing important studies of Rousseau ('Our Natural Rights'), Fichte, Hegel, and Nietzsche.

Between sociology and the philosophy of the state lies the study of politics in the modern sense; the phenomena of communities under government considered with reference to the way in which they are governed—a positive study, which its subject-matter makes essentially teleological. Of such a nature are FREEMAN, Compar. Politics; SEELEY, Introd. to Politics; MILL, Representative Government; BAGEHOT, Physics and Politics; SIDGWICK, Elements of Politics. See also the citations given under SOCIOLOGY, and SOCIAL PSYCHOLOGY. (B.B.)

State of Consciousness (or **Conscious State**): Ger. *Bewusstseinszustand*; Fr. *état de conscience*; Ital. *stato di coscienza*. CON-

SCIOUSNESS (q. v.) 'now' or 'at present,' with all that is in it.

So when we speak of past states of consciousness, we mean consciousness as it was 'then,' i. e. in an earlier 'now'; and a future state of consciousness is consciousness 'then,' i. e. a future 'now.' (J.M.B., G.F.S.)

State of Nature: Ger. *Naturzustand*; Fr. *état de nature*; Ital. *stato di natura*.

(1) That moral and social condition in which mankind would be in the absence of political organization, civil law, and government. 'A state of perfect freedom to order their actions and dispose of their possessions and persons as they think fit, within the bounds of the law of nature, without asking leave, or depending upon the will of any other men' (Locke, *Civil Government*, chap. ii).

(2) More specifically, the state of nature is the condition of things (*a*) in which men found themselves before the existence of a common government and legislation: there was then no law but the law of NATURE (q. v.); (*b*) in which nations stand towards each other now, there being no common government.

The expression occurs in Grotius in both senses. The state before government has been variously conceived as (by Hobbes) a war of all against all, or (by Locke and Rousseau) a state of disorder, but possibly peaceful. (F.H.G.–J.B.)

The distinction of state of nature from that of culture appears first in the Cynics (the conception, e. g., that Prometheus, the culture-bringer, was rightly punished). (K.G.)

The chief controversies of political science have raged around the concept of 'a state of nature.' To understand these it is necessary to subdivide the topic as follows: (1) Does the term mean a state in which mankind actually was before governments existed? (2) In a state of nature are men equal or unequal? (3) In a state of nature are men alike or unlike? (4) In a state of nature are men sympathetic, affectionate, tolerant, and just, or are they quarrelsome, treacherous, and merciless? By systematically finding the answers that the great political writers have given, explicitly or by implication, to these questions, we can see exactly wherein their theories differed or agreed; otherwise they are a hopeless confusion. (1) No writer of consequence has seriously regarded the actual state of man before governments arose as of any real importance for political theory now. The language used by Hobbes, Locke, and others has continually referred to an imaginary pre-political man, but the real question under discussion has always been, given human nature as we know it, what would men do, and how would they live, if they were not subject to government? (2, 3 and 4) Plato, Aristotle, and all political writers to and including Machiavelli, assumed that men are by nature unequal (even though kindred), and that therefore governments inevitably arise and have their justification in the natural supremacy of the strong over the weak, of the wise over the foolish. In Hooker, *Ecclesiastical Polity*, Bk. I (1594), we have a totally different conception. The men who dwell together in one place are not only substantially of one kin, but are also substantially equal. They are endowed with natural affection and desire one another's good will. 'My desire, therefore, to be loved of my equals in nature, as much as possibly may be, imposeth upon me a natural duty of bearing to themward fully the like affection; from which relation of equality between ourselves and them that are as ourselves, what several rules and canons natural reason hath drawn for direction of life, no man is ignorant' (*Eccl. Pol.*, Lib. I). Government therefore, according to Hooker, is a convenience rather than an imperative necessity; it may be modified or reformed; and it may be held to a strict conformity to that natural justice which is anterior to it. Hobbes, like Hooker, regards men as substantially equal, but, unlike Hooker, he conceives of them as being of widely different minds, and as moved by conflicting interests. Consequently, 'men have no pleasure (but, on the contrary, a great deal of grief) in keeping company, where there is no power able to overawe them all' (*Leviathan*, chap. xiii). Accordingly, a state of nature is a state of war, of every man against every man. Government therefore is instituted to stop extermination, and the compact between subjects and sovereign is inviolable. The subjects, in surrendering their natural freedom, have surrendered their power to amend, and they cannot require the sovereign to conform to the principles of an antecedent natural justice, because there never were any. The sovereign originates justice and is not conditioned by it. Locke gets back to the conceptions of Hooker, and develops them. The state of nature he conceives as 'a state also of equality, wherein all the power and jurisdiction is reciprocal, no one having more than another; there being nothing more evident than that creatures of the same species and

rank, promiscuously born to all the same advantages of nature, and the use of the same faculties, should also be equal one amongst others without subordination or subjection' (*Civil Government*, chap. ii). Such a state of nature 'has a law of nature to govern it, which obliges every one; and reason, which is that law, teaches all mankind, who will but consult it, that, being all equal and independent, no one ought to harm another in his life, health, liberty, or possessions' (ibid.). Governments therefore are instituted not to create justice, but only to formulate and administer it; and they must themselves conform to the natural justice of a state of nature. Subjects may always appeal from civil government to natural justice, and therefore may amend, reform, or overthrow their governments.

In the light of modern sociology the reconciliation of these conflicting views is not difficult. In the most homogeneous populations there are enough inequalities of strength and wisdom to establish relations of supremacy and subordination, and to ensure the evolution of government. If the population is exceedingly heterogeneous the natural relations of men tend towards the type described by Hobbes, and government approaches absolutism. This is as true of majority rule in a nominal democracy as of personal rule in a monarchy. If the population becomes highly homogeneous, above all in thought, sympathies, and purposes, and if a relative equality prevails, spontaneous social relations are on the whole friendly, tolerant, and just. It is recognized that positive law must conform to ethical standards, and governments are made liberal and constitutional. Hooker and Locke have never received due credit for their penetration in perceiving that natural society and natural justice presuppose equality and homogeneity in the population, and above all, like-mindedness.

Literature: Plato, The Republic, and The Laws; Aristotle, The Politics; Machiavelli, Il Principe (1532); Hooker, Eccles. Polity (1594); Grotius, De Jure Belli et Pacis (1625); Hobbes, De Corpore Politico (1650), and The Leviathan (1651); Locke, Civil Government (1690); Rousseau, Du Contrat Social (1762). (F.H.G.)

Static Economics [Gr. στατικός, standing, causing to stand]: Ger. *statische Oekonomie*; Fr. *économie statique*; Ital. *economia statica*. (1) In the strict sense, that part of economic science which deals with quantities, and not with rates per unit of time.

(2) In the popular but less correct sense, all economic analysis which assumes a stationary social structure, so that we can assume small variations of single elements, and trace a readjustment of the disturbed equilibrium. Cf. Sociology.

There is a tendency among the followers of the Austrian school, and in fact among all those who use modern mathematical methods in economics, to treat kinetic problems by methods of statical analysis—to assume that an equilibrium expressed in terms of *rates* of income, supply, or demand, is synonymous with an equilibrium of pure quantities in the same ratios, and that a discussion of the effect of a small variation in one of these quantities in producing a new equilibrium can be carried over into terms of rates by a simple reintroduction of the time factor. By this method problems of Distribution (q. v.) are artificially simplified and incorrectly solved. (A.T.H.)

Static Sensation: Ger. *statische Empfindung*; Fr. *sensation statique*; Ital. *sensazione statica*. Sensation arising in connection with bodily position. (J.M.B.)

Although such knowledge may arise from the visual and 'tactual' end-organs, it is probable that the semicircular canals and vestibule of the internal ear (the end-organs of the vestibular branch of the n. acusticus) constitute an organ of reflex orientation, regulating the posture and movements of the body, and especially of the head. There seems to be no doubt, further, that the sensation quality of dizziness or giddiness (not to be confused with nausea or sickness) is furnished by some part of this organ: for the rest, its sense functions are still a matter of dispute. Nor are the mechanics of the organ, and the functional interrelation of its two main divisions, as yet fully made out.

The best hypothesis, at the present time, is probably that which separates the functions of vestibule and canals. The otoliths of the vestibule may be supposed, by exerting different pressures in different directions, to inform us of progressive movement in a right line. The 'information' may be conveyed reflexly, or by way of a 'pressure' sensation: the latter theory is in accord with the original function of the otolith sac as an organ for the apprehension of jar or shake, a 'preaural ear.' The canals and ampullae would then be the organ of orientation, and especially of orientation after rotation. The giddiness sensation may be mediated by

ciliary movements of the hairs of the hair-cells, such movements naturally varying with change of the pressure of the endolymph. Cf. Dizziness, Equilibrium, Kinaesthetic Sensation, Orientation, Position, Rotation Sensation, and Illusions of Motion and Movement.

Literature: Külpe, Outlines of Psychol., § 23; Wundt, Physiol. Psychol. (4th ed.), ii. 27; Sanford, Course in Exper. Psychol., expts. 45–51; Y. Delage, Études expérimentales sur les illusions statiques et dynamiques de direction, Arch. de Zool. Expér., iv. (2) 525 ff.; Warren, Sensations of Rotation, Psychol. Rev., ii. 273 ff.; E. Mach, On Sensations of Orientation, Monist (1897); and Bewegungsempfindungen (1875); C. König, Étude expérimentale des canaux semi-circulaires (1897); Kreidl, Pflüger's Archiv, li; Loeb, ibid., 1891; Breuer, K. k. Ges. d. Aerzte in Wien, Nov. 14, 1873; Cyon, Recherches sur les fonctions des canaux semi-circulaires, 1878; Crum-Brown, J. of Anat. and Physiol., viii; Grasset, Malad. de l'équilibre (1901). (E.B.T.)

Statics: Ger. *Statik*; Fr. *statique*; Ital. *statica*. The science which treats of the conditions of physical equilibrium, including the laws of action of forces so related as to produce equilibrium. (S.N.)

Statistics [Lat. *status*, state]: Ger. *Statistik*; Fr. *statistique*; Ital. *statistica*. The systematic observation and treatment of facts on the basis of their relative numbers. (J.M.B.)

The study of statistics as a whole is usually divided into two branches: theoretical and practical statistics. Theoretical statistics are concerned with the domain of statistics in general, and with the principles, methods, and technique of statistical inquiry. Practical statistics deal with the statistical material which is presented to us in the various departments of fact, social life, &c.; such, for instance, as the statistics of population or demography, the statistics of trade, the statistics of pauperism, educational statistics, political statistics, judicial statistics, &c. For illustrations see Variation (statistical treatment of), and Moral Statistics (also for literature). (W.D.M.)

Statue of Condillac. Condillac, in his *Traité des Sensations* (1754), popularized Locke's theory of the origin of knowledge from 'sensation,' eliminating Locke's 'reflection.' In illustration of the process, he employed the fiction of a statue, at first without mind, which receives the gift of the senses one after the other, beginning with smell; and attempted to show how the mere presence of these sensations would generate all mental processes and products. The presence of the sensation equals perception; the stronger one gives attention; recurrence of a former one, memory; the practically simultaneous presence of an old and new one, judgment (comparison), &c.; while the sense of touch carries with it the consciousness of objectivity. This allegory of the statue became a favourite literary device of the sensationalists. (J.D.)

It may be said that the one thing which *would* be true of such a statue—that it would move if endowed with sensation!—was not asserted of it by Condillac. (J.M.B., J.D.)

Status [Lat.]: Ger. *Zustand*; Fr. *état*; Ital. *stato*. The class relation in which a person stands before the law to others or to the state; the aggregate of rights and duties attached by law to a person as one of a certain class (Markby's *Elements of Law*, chap. iv. § 177; Austin on *Jurisprudence*, Lect. xl; Anson's *Principles of Contract*, 328). This person cannot by contract vary these legal rights and duties. 'If he could, his private agreements would outweigh the law of the land' (Freeman's Appeal, 68 Conn. Law Reports, 539; Mitchell *v.* First National Bank, 180 United States Reports, 476).

Status is one of the first things recognized or defined by law. The relations of men to each other are determined by status before they are determined by contract.

See *Dig.*, i. 5, *De statu hominum*; 6, *De his qui sui vel alieni iuris sunt*; 7, *De adoptionibus*, &c.

Literature: Puffendorf, De Officio Hominis et Civis, ii. chap. i, 'De Statu Hominum naturali'; Heineccius, Elementa Iuris Naturae et Gentium, Lib. II. chap. i.; Fiore, Private Int. Law, i. § 41 ff.; von Bar, Theorie u. Praxis des internationalen Privatrechts, i. § 133 ff., ii. § 421. (S.E.B.)

Status (social): see Social Status.

Statute [Lat. *statutum*]: Ger. (1) *Statut*, (2) *Verordnung*, (3) *Gesetz*; Fr. (1) *statut*, (2, 3) *loi*; Ital. (1) *legge scritta, atto del parlamento*, (2, 3) *legge, statuto*. (1) A law expressed in writing, enacted by the sovereign legislative authority of a state.

(2) One of the permanent rules prescribed by the proper authority for the government of a corporation of a charitable or quasi-public character.

(3) As used by civilians: any kind of law or governmental regulation, and each of its

commands or prohibitions (Merlin, *Répertoire de Jurisprudence*, 'Statut'). *Real statute*: one which concerns property, and persons only as related to property. *Personal statute*: one which concerns persons, and property only as coincident, e.g. one dealing with questions of *status*. *Declaratory statute*: one declaring what the law on some point previously was. *Remedial statute*: one giving a remedy. *Penal statute*: one directing or forbidding certain acts under a penalty. *Statute law*: law created by statute, as distinguished from natural, customary, or unwritten law.

Literature: MAINE, Ancient Law, and Early Hist. of Inst.; FOELIX, Traité du Droit International Privé, i. chap. iv. (S.E.B.)

Steffens, Henrik. (1773–1845.) Born in Norway, and educated in Denmark and at Copenhagen in theology and science, he became intimately acquainted (1794) with Schelling and his philosophy of nature. Returned to Denmark, 1802, and began his work as an author. Professor of natural science at Halle, 1804; at Breslau, 1811; and at Berlin, 1831, until his death. He was first a Spenerian pietist, then an Old Lutheran, and finally an advocate of Schleiermacher's philosophy.

Stereoscope [Gr. στερεός, solid, + σκοπεῖν, to see]: see STEREOSCOPIC VISION.

Stereoscopic Vision: Ger. *stereoskopisches Sehen*; Fr. *vision stéréoscopique*; Ital. *visione stereoscopica*. Vision with a stereoscope; a binocular instrument which presents to each eye its own plane picture of a tridimensional object. The conditions of the depth perception can, evidently, be exaggerated in it, since two pictures may be made of the same object from two points which are much further apart than are the two eyes. (E.B.T.)

A pair of images of this sort gives the perfect impression of solidity when momentarily illuminated by the electric spark; in free stereoscopy (where diagrams are combined by fixating a near or a far point and detaching the accommodation of the eyes from its ordinary close association with convergence) the relief may be reversed according as the point of fixation is in front of or behind the plane of the paper; it has been shown by Schön (*Arch. f. Ophthal.*, xxii, xxiv) that an object seen by double images may be transferred from within to without the horopter circle, and reversely, by altering the relative brightness of its nasal and temporal half-images. From all this it follows (and most conclusively from the last consideration) that differences in retinal images are sufficient of themselves to mediate the perception of solidity (Wundt, *Physiol. Psychol.*, 4th ed., ii. 227).

There are other methods by which pictures in two dimensions can be represented to the eye in relief. (1) If a right-hand view in red is superimposed in the printing upon a left-hand view in blue, and if the eyes are furnished with spectacles consisting of blue glass for the right eye and red glass for the left eye, two black images are produced which are suitable for binocular fusion into a single three-dimensional impression (method invented by L. D. du Hauron of Algiers; materials and slides sold by the Comptoir Suisse de Photographie, Geneva, and by Williams, Brown, & Earle, Philadelphia). (2) Polarized light also furnishes a method of giving different appropriate images to the two eyes, and, like the last-mentioned, it is adapted to representation in the lecture room. By means of a double lantern, two pictures are thrown together upon a screen by two beams of white light polarized in planes at right angles to each other, and each person in the audience is furnished with eye-glasses consisting of a pair of analysers. (This apparatus was invented by, and may be obtained from, John Anderton, of Birmingham, England.) (C.L.F.)

The reflecting stereoscope was invented by Wheatstone (described 1833 and 1838); the current form of the refracting stereoscope (also first described by Wheatstone) is due to Brewster (1843).

Literature: HELMHOLTZ, Physiol. Optik (2nd ed.), 782 ff., &c.; E. B. TITCHENER, Exper. Psychol., I. ii. (1901) 257 ff. On free stereoscopy see SANFORD, Course in Exper. Psychol., expt. 212; on stereoscopy by difference in colour, ibid., expt. 221. (E.B.T.)

Sterility [Lat. *sterilis*, barren]: Ger. *Unfruchtbarkeit*; Fr. *stérilité*; Ital. *sterilità, infecondità*. The condition of not producing young; infertility.

In botany, male flowers (having stamens only) are termed sterile. In female animals sterility may be due to inability to produce ova, or in the higher forms to inability to sustain the ova until birth, or to some obstruction to the actual impregnation of the ova. (C.S.M.)

The principal biological question in connection with sterility is that of the mutual infertility of species with one another. Darwin supposed this sterility of species *inter se* to be a result of divergent evolution produced by other causes; Romanes reverses the case, and in his hypothesis of PHYSIOLOGICAL SELECTION (q. v.) makes variations towards

sterility (i. e. relative infertility) the beginning of divergent lines of evolution, which issue in new species. Pearson has utilized the opposite sort of variation, i. e. towards increased FERTILITY (q. v.), in his theory of REPRODUCTIVE SELECTION (q. v.). Cf. NATURAL SELECTION, ad fin. (J.M.B.)

Stewart, Dugald. (1753–1828.) Born at Edinburgh, he studied there and at Glasgow. Assistant professor in mathematics at Edinburgh, 1774; succeeded his father in that chair, 1785, and was the same year transferred to the chair of moral philosophy; resigned his chair in 1810 on account of ill health, and retired to his seat on the Firth of Forth, where he devoted himself to literature until his death. See SCOTTISH PHILOSOPHY, and REALISM (natural).

Sthenic [Gr. *σθένος*, strength]: Ger. *sthenisch*; Fr. *sthénique*; Ital. *stenico*. (1) Energetic; characterized by vigour of function. Also used as synonym of stimulating. Asthenic is equivalent to weak, feeble.

(2) Sthenic diseases are those attended with a morbid increase of vital action, and are thus opposed to states of debility. (J.J.)

Stigma [Gr. *στίγμα*, brand or mark]: Ger. *Stigma*; Fr. *stigmate*; Ital. *stimate*. (1) In mental pathology: a mark of degeneration or neurotic diathesis.

Anatomical or teratological stigmata (stuntedness, malformations, asymmetries of body, peculiarities of hair, of the ear, of the limbs, feminism, persistence of infantile characteristics, &c.) are distinguished from functional stigmata (backward development of speech or locomotion, anomalies of voice, of movements, absence of reflexes, sexual perversions, optical anomalies such as strabismus, colour blindness, &c.). See DEGENERATION and literature there cited.

(2) Patches on the skin in the form of inflammation or drops of blood produced by suggestion. Such phenomena are observed in extreme cases of HYPNOSIS (q. v.) and HYSTERIA (q. v.) and in religious ecstasy. One of the best known cases is that of Louise Lateau.

Literature: D. HACK TUKE, Influence of the Mind on the Body (2nd ed., 1884), i. 119–26, and references there given; the literature of HYPNOSIS. (J.J.)

Stimulant [Lat. *stimulare*, to prick]: Ger. *Reizmittel*; Fr. *stimulant*; Ital. *stimolante*. Any condition or substance that temporarily quickens the natural function of a part or organ.

In addition to this general sense of the term (including physical agencies, such as warmth, cold, electricity, and mental excitement, such as joy, hope), stimulant is used in a special sense to refer particularly to the action of drugs on the nervous system. Such action may in turn be local or general and may affect one group of functions more than another. Among such stimulants alcohol is practically the most important. See ALCOHOLISM, INTOXICATION, and PSYCHIC EFFECT OF DRUGS. (J.J.)

Stimulation (1) and (2) **Stimulus** [Lat. *stimulus*, a goad]: Ger. (1) *Reizung*, (2) *Reiz*; Fr. (1) *excitation*, (2) *stimulus, excitant*; Ital. (1) *eccitamento*, (2) *stimolo*. The cause of a nervous excitation which is attended (or followed) by a change in consciousness is a stimulus, and the process set up in a terminal organ by the action of a stimulus is the stimulation. The stimulus may be physical or physiological; the stimulation is always physiological. Cf. ORGANIC SENSATION, and NERVE STIMULATION AND CONDUCTION.

The psychological stimulus is evidently a subform of the physiological, standing to the latter as the psychophysical bodily process stands to the group of bodily processes at large. Stimuli have been classified as internal and external, mechanical and chemical, adequate and inadequate, &c. (E.B.T.)

WEBER'S LAW (q. v.) is an exact formulation of the relation of stimulus to sensation, and is sometimes called 'law of stimulus' or of 'stimulus intensity.' (J.M.B.)

Stimulus: see STIMULATION.

Stirp [Lat. *stirps*, root, race, stock]: Ger. *Stamm* (in use, but not exact), *Rassenanlage* (Barth); Fr. same as Eng. (used by Delage); Ital. *stirpe* (in use, but not exact—E.M.). A term suggested by Francis Galton 'to express the sum-total of the germs, gemmules, or whatever they may be called, which are to be found in the newly fertilized ovum.'

The term was suggested in the paper cited below. Although a modified PANGENESIS (q. v.) is allowed to play some part in heredity, the main stress is laid on the handing on of 'stirp,' and much of the argument is on the lines since developed by Weismann. The conception is practically that of 'stock' as popularly used. Cf. WEISMANNISM.

Literature: F. GALTON, A Theory of Heredity, J. Anthropol. Inst. (1876); DELAGE, Protoplasma et l'Hérédité, 560 ff.; BROOKS, The Foundations of Zoology (1899). (C.LL.M.)

Stoa [Gr. *στοά*, a porch]: see Stoics, under SCHOOLS OF GREECE, III.

Stock: see STIRP.

Stoicism: Ger. *Stoicismus*; Fr. *stoïcisme*; Ital. *stoicismo*. The world-view, and the practical attitude towards life, belonging to, or similar to that of, the Stoics. In its practical bearing it is popularly no less than philosophically contrasted with EPICUREANISM (q.v.). See SCHOOLS OF GREECE, III. (J.M.B.)

Stoics: see SCHOOLS OF GREECE, III.

Strabismus [Gr. *στραβισμός*, a squinting]: Ger. *Strabismus, Schielen*; Fr. *strabisme*; Ital. *strabismo*. Squinting; a condition in which the visual axes fail to be directed to the same point owing to the inco-ordinate action of certain of the muscles of the eyes. Also termed heterotropia.

It may be due to over-action, weakness, or paralysis of one or more of the ocular muscles. It may be distinguished as (1) convergent, (2) divergent, or (3) complex. In the first case the squinting eye is turned to the nasal side, and its visual axis crosses that of the other eye at a point nearer than the object looked at. Such a condition may result from a paralysis or paresis of one of the external recti muscles, or from excessive development of both internal muscles, the latter being quite commonly associated with hypermetropia. In divergent strabismus (less common) the squinting eye is turned to the temporal side, and its visual axis crosses that of the other eye beyond the object looked at. This is seen in high grades of myopia. In complex cases there may be upward or downward divergences, with or without other inco-ordinations. Various kinds of strabismus are further distinguished according as the affection is constantly resident in one eye or alternates, the eyes having full range of movement, &c.

Literature: HALTHOUSE, Strabismus; NORRIS and OLIVER's Syst. of Diseases of the Eye. (J.J.)

Strain Sensation: Ger. *Spannungsempfindung*; Fr. *sensation de tension musculaire, sensation des tendons*; Ital. *sensazione muscolare di tensione*. See TENDON SENSATION, and cf. EFFORT, MUSCULAR SENSATION, and RESISTANCE SENSATION. (E.B.T.)

Strato. Born at Lampsacus and died at Athens (cir. 270 B.C.). He was a pupil of Theophrastus and a prominent member of the Peripatetic School. See PERIPATETICS.

Strauss, David Friedrich. (1808–74.) Born in Würtemberg, he studied at Blaubeuren and Tübingen, having Baur for a teacher in both places. Repelled by Kant, and attracted by the mystics and faith philosophers, such as Jacobi, Schelling, Jacob Böhme, and (later) Schleiermacher, he became a devoted disciple of Hegel, joining the radical wing of the Hegelian school, but later showed a tendency to naturalism and materialism.

Stream of Thought: Ger. and Fr. not in use; Ital. *corrente del pensiero* (Ferrari). The conscious life of an individual considered as a series of states continuous in time. (G.F.S., J.M.B.)

The unity of a thought-process is constituted by the common reference of all its phases to a single object or topic, and on the subjective side by unity and continuity. The stream of consciousness is a stream of thought, so far as it consists of a succession of such processes each having its own unity of object and interest. In the fully developed personal consciousness these successive processes have also more or less thought continuity with each other, inasmuch as their several objects are all parts or aspects of one object—the universe of the world and of the self in its systematic unity. (G.F.S.)

The phrase has been made current by James (*Princ. of Psychol.*), who uses the term for the stream of conscious content in general, to which he applies indifferently the terms 'thought' and 'feeling.' (J.M.B.)

Strength [AS. *streng*, strong]: Ger. *Stärke, Kraft*; Fr. *force, forces* (physiological); Ital. *forza*. Capacity in general. Usually applied in physiology (1) to the capacity for doing muscular work, measured in lifting, grasping, endurance, &c., and (2) to physical vigour or tone, the opposite of ASTHENIA (q.v.). Cf. TESTS (psychophysical), WORK and LABORATORY AND APPARATUS, III, A. (J.M.B.)

Strength (in logic): see VALIDITY, passim.

Stroboscope: see LABORATORY AND APPARATUS, III, B, (*a*), (9), and ILLUSIONS OF MOTION AND MOVEMENT, I.

Stroke [AS. *strican*, to go]: Ger. *Schlaganfall*; Fr. *attaque, ictus*; Ital. *colpo, ictus*. A sudden attack; most frequently used for a stroke of PARALYSIS (q.v.). (J.J.)

Structure (organic) [Lat. *structura*, a building]: Ger. *Struktur, Bau, Aufbau*; Fr. *structure*; Ital. *struttura*. A definite arrangement and connection of parts, with view to a definite function. (C.S.M.)

Struggle for Existence: see EXISTENCE (struggle for), and RIVALRY.

Struggle of the Parts: translation of Roux's Kampf der Theile. See INTRASELECTION. (J.M.B.)

Strümpell, Ludwig. (1812–99.) Born at Schöppenstedt; studied at Königsberg and Leipzig. He taught at Dorpat, first in philosophy, later in pedagogy also; in 1871 he was called to Leipzig as Docent, and in 1872 was made professor. He was a follower of Herbart. His chief work was in the field of pedagogy.

Studies: see INSTRUCTION.

Stupidity [Lat. *stupiditas*, dullness]: Ger. (1) *Stupidität*, (2) *acute Demenz*; Fr. *stupidité*; Ital. *stupidità*. (1) Popularly, dullness of perception or understanding; either as a momentary condition of confusion and lack of usual clearness of thought, or as a temperamental deficiency, with sluggishness of intellectual operations.

(2) Sometimes used (as the French stupidité) as synonymous with a state of STUPOR (q. v.) or stupefaction. (J.J.)

Stupor [Lat. *stupor*, insensibility, dullness]: Ger. *Stupor*; Fr. *stupeur*; Ital. *stupore*. (1) In general, a suspension of psychical operations; a condition of intellectual insensibility in which the faculties are deadened or dazed, in which the attention is centred within and not easily aroused, and in which all the mental processes are more or less in abeyance.

General conditions of stupor of greater or less degree may occur in idiocy, in dementia, in the sequence of fluctuations in mania or melancholia, and in circular insanity.

(2) Applied more specifically to two conditions, the one called (*a*) anergic, the other (*b*) delusional stupor. (*a*) The former, termed by Esquirol 'acute dementia,' occurs either as a primary affection or more usually as an intercurrent symptom of mania, epilepsy, melancholia, general paralysis, or other insanity. Such patients seem deprived of all mental and motor energy, and often stand or sit in the same position for hours. Some will strongly resist any attempt to change their positions or attitudes, while others allow their limbs to be placed in and to retain any given posture. Such patients must be fed and cared for in every detail; they seem to have little perception or memory, and on recovery may recall nothing of the entire period of the attack.

(*b*) The second condition is a true melancholia, and often termed melancholia cum stupore. Here the restraint from action, speech, and food is apt to be the result of direct fear or of a systematized delusion. The patient often remembers on recovery the train of thought which prompted his inactivity and obstinacy. The expression and attitude are characteristic; the patient sits motionless with clasped hands, fixed vacant stare, the saliva flowing from his half-open mouth, the expression one of vacancy or terror. The movements are torpid, and although terrifying hallucinations may be present, nothing betrays the emotions inspired by the subjective world of terror in which he lives.

It should be added that there is some tendency to abandon the term stupor, except as a symptom, and to refer cases of stupor to KATATONIA (q. v.), to the depressive states of mania, to the transitory stages of epilepsy, and the like.

Literature: WHITWELL, A Study of Stupor, J. of Ment. Sci. (1889), xxxv. 360–73; ZIEHEN, Psychiatrie (1894); KRAEPELIN, Psychiatrie (1901). (J.J.)

Stuttering [imitation of the sound, akin to Ger. *Stottern*]: Ger. *Stottern*; Fr. *bégaiement*; Ital. *intoppare, incespicare*. A difficulty in speech marked by repeated and uncontrollable spasmodic repetition of the initial part of a syllable (usually an explosive consonant—b, p, d, t).

In general usage, stuttering and stammering are employed almost interchangeably. As a rule stammering is regarded as the more general term, including all speech difficulties of this type, and stuttering as the particular difficulty above defined (cf. STAMMERING). Kussmaul uses Stottern as equivalent to stammering in the general sense, and Stammeln to indicate the inability to properly pronounce certain letters. Severe Stammeln makes speech difficult to understand, and becomes LALLING (q. v.). According to Kussmaul, Stottern and Stammeln are thus quite distinct: the stutterer has no difficulty with special letters, but cannot voice explosive sounds; the stammerer has no spasm or cramp. Singing may affect stuttering, but not stammering. Increased attention improves the latter, but makes the former worse. As indicated, this distinction is not usually expressed by the same words in English. Cf. SPEECH AND ITS DEFECTS.

Literature: KUSSMAUL, Störungen der Sprache, index 'Stammeln' and 'Stottern'; WYLLIE, Disorders of Speech, chaps. i and vi; LIEBMANN, Vorlesungen über Sprachstörungen, Heft 1 and 2 (1898). (J.J.)

Style [Lat. *stilus*, a writing instrument]: Ger. *Stil*; Fr. *style*; Ital. *stile*. A distinctive character or mode of artistic presentation which controls all the detailed features.

Used in various connections: (1) In general, as good or bad style; idealistic or realistic style. (2) Historically, as classic, Gothic, romantic, Doric styles. (3) With reference to the distinctive traits of the respective arts, as picturesque, sculpturesque, musical, poetic style. (4) Of an individual, as 'in the style of Rembrandt.' (5) As an attribute of value, as 'this artist (or work) has style.'

Literature: VOLKELT, Aesth. Zeitfragen (1895), chap. iv; FECHNER, Vorschule d. Aesth. (1876), chap. xxvi; GUYAU, L'Art au point de vue sociologique (1889), chap. x; RIEGEL, Die bildenden Künste (4th ed., 1895), chap. x; SPENCER, The Philosophy of Style, Essays, ii; see also the aesthetic publications of VISCHER, KÖSTLIN, SCHASLER, VÉRON, RUSKIN, and CARRIERE. (J.H.T.)

Style (in sociology): CUSTOM (q. v.) of the more temporary and ephemeral sort considered as embodying models for imitation; equivalent to mode.

Made an important factor in the imitation theory of social propagation by Tarde (*Lois de l'imitation*). (J.M.B.)

Suarez, Francisco. (1548–1617.) Born of noble family in Grenada, he first studied law. But he entered the Order of Jesus, and devoted himself zealously to theology and philosophy. He taught in Rome, Alcala, Salamanca, and finally in the high school of Coimbra. He died at Lisbon.

Subalternant: see SUBALTERNATION, and OPPOSITION (in logic).

Subalternate: see SUBALTERNATION, and OPPOSITION (in logic).

Subalternation [Lat. *sub* + *alter*, other]: Ger. *Subalternation*; Fr. *subalternation*; Ital. *subalternazione*. The relation of a particular proposition to the universal proposition having the same subject, predicate, and quality, that particular proposition ('Some *S* is—or is not —*P*,' called the *subalternate*) being regarded as following by immediate inference from that universal ('Any or all is—or is not—P,' called the *subalternant*). Cf. the diagram given under OPPOSITION (in logic). (C.S.P.)

Subconscious [Lat. *sub*, under, + *cum*, together, + *scire*, to know]: Ger. *halbbewusst*, *unterbewusst*; Fr. *subconscient*; Ital. *subcosciente*, *subconscio*. (1) Not clearly recognized in a present state of consciousness, yet entering into the development of subsequent states of consciousness.

(2) Loosely, the UNCONSCIOUS (q. v.). (J.M.B., G.F.S.)

It is a least degree of consciousness, required by the law of continuity. We have (*a*) the conscious process given in attention, the 'focus' of consciousness; (*b*) the conscious process given in the state of inattention, or in the rest of the 'field' of consciousness; and (*c*) the subconscious process, which cannot itself attract attention, or be made the object of voluntary attention, until it has attained to stage (*b*), i. e. until it has ceased to be subconscious.

The facts which have led to the hypothesis of a subconsciousness are (*a*) the existence of blind conations, organic tendencies, &c., for which no conscious antecedent can be discovered; (*b*) the mechanization of complicated movements, such as piano-playing; (*c*) the appearance in 'memory' of ideas which seem to have cropped up of themselves, i. e. have no assignable physical or mental condition; (*d*) the phenomena of 'secondary' PERSONALITY (q. v.), &c. (E.B.T.)

These distinctions are those of 'degree' of consciousness, as contrasted with that of GRADE (q. v.) of consciousness. It is important that we separate carefully these functional phases in consciousness of content, from the genetic phases in the evolution of mind, whatever analogies may be discovered between them. The diagram given under PARALLELISM (psychophysical) illustrates the two series —the horizontal dotted line at each part has its differences of degree, the vertical dotted line gives differences of grade. In other words, at every grade of consciousness we find distinctions of degree. The term 'stage' (Stufe) is sometimes used for grade.

DISPOSITIONS (q. v.) generally are subconscious. Particular experiences often strike us, as when we are occupied with talking, writing, &c., of which we become aware only subsequently; at their occurrence they were subconscious. The subsequent state shows their working in the development of consciousness.

The terms 'subliminal' and 'marginal' are used to characterize the subconscious, both figuratively. That is subliminal which is below a theoretical THRESHOLD (q. v.) of consciousness; that marginal which is not in the focus of the field (after analogy with the field of vision; cf. Ll. Morgan, *Introd. to Compar. Psychol.*). Cf. UNCONSCIOUS, and PERSONALITY (disorders of).

To theories which accept 'unconscious' mind, the subconscious is a transition state through which presentations pass in coming to

the focus (attention). The Herbartian 'mechanism of presentations' (cf. HERBARTIANISM) did much to introduce the notions both of the unconscious and of the subconscious.

The subconscious and 'unconscious' have been hypostatized to do many marvellous things; art has been made the product of the subconscious, the genius has been endowed with a wonder-working 'subconscious'; all of which means that certain mysteries of endowment are not open to introspective analysis—certainly to those of us who have them not—and because they are not spread out on the tablet of consciousness, the subconscious, it is held, plays the greater part.

The terms 'semi-' and 'half-conscious' are loosely used for sub- or vague consciousness. (J.M.B.)

Literature: WARD, art. Psychology, Encyc. Brit. (9th ed.), xx. 47 f.; BALDWIN, Handb. of Psychol., i. (1890) 57; KÜLPE, Outlines of Psychol., 190, 291; TITCHENER, Exper. Psychol., i. 194; Primer of Psychol., 256. See also UNCONSCIOUS, and BIBLIOG. G, 2, *c*. (E.B.T.—J.M.B.)

Subcontrary [Lat. *sub* + *contra*, against]: Ger. *subconträr*; Fr. *subcontraire*; Ital. *subcontrario*. Two propositions having the same subject and the same predicate, if so related that they can both be true, but cannot both be false, are said to be subcontraries; the relation is called 'subcontrary' OPPOSITION (q.v., with diagram).

The ordinary doctrine is that 'Some *S* is *P*' and 'Some *S* is not *P*' are subcontraries. Thus, 'Some phoenixes rise from their ashes,' and 'Some phoenixes do not rise from their ashes.' But it is better to regard both as false when their subjects are non-existent. (C.S.P.)

Subject (-ive) [Lat. *sub*, under, below, + *iacĕre*, to throw]: Ger. *Subjekt, subjektiv*; Fr. *sujet, subjectif*; Ital. *soggetto, soggettivo*. (1) The material or content of a thought or discourse, as distinct from that with which the thought is concerned; or OBJECT (q.v.), subject-matter.

(2) Hence, the substantive, the real.

(3) That which is the source and centre of the process of thought, or, more widely, of all psychical processes—the self, ego, mind. In this latter connection *subjective* assumes two meanings: (*a*) that which is concerned with, or arises from, mental operations, as distinguished from the objective as appertaining to the external and material world; (*b*) that which is *merely* mental; the illusory; that which lacks validity; that which is not universal, but confined to some one individual, and to him because of something accidental in his make-up.

In aesthetics, subjective and objective are often opposed to one another as designating two types of criticism: the former, that into which the personality of the author enters; the latter, impersonal, impartial, and more or less cold.

The term begins with a logical sense in Aristotle, which, however, as is usual in Greek thought, has an ontological meaning as well. Logically, it is the subject of a proposition, or of a discourse, that of which something is asserted, *ὑποκείμενον*. But Plato had distinguished between *ὄνομα* as subject and *ῥῆμα* as predicate, the *ὄνομα* being the noun or substantive, the constant as against the changing verb, which thus connotes *οὐσία*, essence (*Theaet.* 206, and *Crat.* 399). Aristotle even more explicitly identifies the subject with the substrate, the SUBSTANCE (q.v.)—which, indeed, is only the Latin translation of his *ὑποκείμενον*. This, as indeterminate subject, is *ὕλη*, matter; but as determinate, it is specific individual being, genera being only secondary subjects. It can be subject only, never predicate (see Prantl, *Gesch. d. Logik*, i. 217 ff.; Ueberweg, *Logic*, 143–4; Trendelenburg, *Hist. Beitr.*, i. 13–34, and 54–6). According to the Stoics (Prantl, op. cit., i. 428–32; Trendelenburg, op. cit., 221), the subject is one of the four fundamental categories, and designates being without quality, and, therefore, the ultimate subject of all judgment; the unqualified—the pure universal. As such it is the receptacle in which the formative or seminal reason works.

Here we have a complete fusion of the logical and ontological senses. Apuleius and Capella (Prantl, *Gesch. d. Logik*, i. 581, 676) used the terms *subdita* and *subjectiva* as technical terms for the subject of a proposition or judgment; while Boethius for the first time (so Prantl, loc. cit., i. 696) makes use of the terms *subjectivum* and *praedicatum*. In this form the term passed into scholastic thought. As might be expected, we owe to a nominalist, Occam, the first exposition of the ambiguity of the term, and the distinction of its real form and its logical sense (*ad existentiam, ad praedicationem*, Prantl, loc. cit., iii. 368). It is to Scotus that we owe the distinction of subjective and objective in the sense which persisted practically till the time of Baumgarten and Kant.

Scotus identified the two terms with the familiar distinction of Arabian thought of

'first and second intentions'; subjective designating the first intention, concrete substantiality, and objective the second intention, or this thing as constituted through a mental operation (Prantl, iii. 208; also the Index, for other similar uses of the term objective).

Gerson anticipated the modern use of the term, using the phrase 'obiectum vel substratum,' and speaks of an objective reason, 'ratio obiectalis,' which mediates real being in knowledge, 'having two aspects, as it were, an external and an internal' (Prantl, iv. 145). Descartes is true to the scholastic use, objective with him meaning always present to thought (existing *idealiter in intellectu*), and subjective that which is really in the things themselves (*formaliter in se ipsis; Medit.*, iii). Eucken (*The Fundamental Concepts of Modern Philosophic Thought*) gives instances of the use of the term in the 18th century prior to Kant. The reversal of meanings in Kant is not hard to understand. The proposition 'I think' has transcendental value: that is to say, it is the function of the self-identity of thought, which, lying at the basis of the categories, is the fundamental *a priori* condition of all knowledge and experience. It cannot be regarded, however, as a thing, as substance, i.e. as soul. 'By this *I* or *he* or *it*, that is, the thing which thinks, nothing is represented beyond a transcendental subject of thoughts $= x$, which is known only through the thoughts that are its predicates' (*Critique of Pure Reason*, 301, Müller's trans.). It is, then, just the absolute subject of all judgments; a significance which clearly enough connects the term with the Aristotelian and logical meaning. But the activity of this function, through the forms of sense and categories of understanding, is necessary to the constitution of objects in experience (of the empirical as distinct from the transcendent object or thing-in-itself); thus, epistemologically considered, if not ontologically, the pure 'I think' or subject has positive significance and value. Thus Kant says: 'If we drop our subject, or the subjective form of our senses, all qualities, all relations of objects in time and space, nay, space and time themselves, would vanish' (ibid., 37). Thus, all the part played by mental activity in constituting empirical objects is repeatedly termed 'subjective.' A double sense is clearly contained here: on one side, this subjective is set over against the objective, when things-in-themselves—reality in its intrinsic nature—are in mind; it is the source of the phenomenal, of that which has not unconditioned validity—tending towards the sceptical and illusory sense of the term. But, on the other hand, it is constitutive of objects as experienced, and therefore has complete (empirical) objectivity; indeed, because of its universal and necessary character, it is more 'objective' than any law or object found in experience itself.

Kant's successors, by abolishing the thing-in-itself, endeavoured to do away with this ambiguity. They endeavoured to give the pure 'I think,' or unity of thought, a completely objective sense; Kant himself having, indeed, admitted the possibility of the transcendental object being at the same time the subject of thinking (ibid., 311). The subject thus becomes the activity which appears equally in mental processes and in the world of experienced objects. It differs from the soul-substance against which Kant had made his polemic, in being essentially activity rather than substrate, and hence by being considered in its functions in the structure of the world of knowledge, morals, and art, rather than in its isolated subsistence; and as transcending the historical, or empirical, individual mind. Such is its use in Fichte; and Hegel fixed the distinction in a classic way in the introduction to his *Phänomenologie* (*Werke*, 14) by saying the truth, the absolute, was to be apprehended as subject, not as substance. But this technical sense easily passed over into a loose, popular one, in which subject meant mind, soul, though with more psychological implication and with more reference (often very vague, however) to the part played by mind in the process of knowledge. Sir William Hamilton was chiefly influential in making the Kantian distinction of subjective and objective at home in English speech, Cousin and the other followers of German thought, in France. When members of quite the opposite schools, such as Spencer and Comte, adopted the terms, they were thoroughly naturalized, and are now in such general use as practically to have displaced the older senses.

Literature: EUCKEN, Fundamental Concepts of Modern Philosophic Thought, chap. i; and Gesch. d. philos. Terminologie, 203–4; Franck's Dict. des Sci. philos., iv. 468–71; HAMILTON, ed. of Reid, 97, 221, 806–9; Discussions on Philos., 5, 605; Metaphysics, i. 157–62. (J.D.)

Subject (in logic). (1) That of which something is asserted in the form of a proposition; its conventional symbol is *S*. (J.M.B.)

(2) That part of a proposition whose function it is to 'indicate,' or denote, what it is of which the proposition is a SIGN (q. v.), and which it signifies, or indirectly images, in the predicate.

[What follows presents a view of propositions, à propos of 'subject,' developed on the basis of the theory of 'signs'; it may be compared with the more commonly received view given under PROPOSITION. (J.M.B.)]

Whether or not every proposition has a principal subject, and, if so, whether it can or cannot have more than one, will be considered below. A proposition may be defined as a sign which separately indicates its object. For example, a portrait with the proper name of the original written below it is a proposition asserting that so that original looked. If this broad definition of a proposition be accepted, a proposition need not be a symbol. Thus a weathercock 'tells' from which direction the wind blows by virtue of a real relation which it would still have to the wind, even if it were never intended or understood to indicate the wind. It separately indicates the wind because its *construction* is such that it must point to the quarter from which the wind blows; and this construction is distinct from its *position* at any particular time. But what we usually mean by a proposition or judgment is a symbolic proposition, or *symbol*, separately indicating its object. Every subject partakes of the nature of an index, in that its function is the characteristic function of an index, that of forcing the attention upon its object. Yet the subject of a symbolic proposition cannot strictly be an index. When a baby points at a flower and says, 'Pretty,' that is a symbolic proposition; for the word 'pretty' being used, it represents its object only by virtue of a relation to it which it could not have if it were not intended and understood as a sign. The pointing arm, however, which is the subject of this proposition, usually indicates its object only by virtue of a relation to this object, which would still exist, though it were not intended or understood as a sign. But when it enters into the proposition as its subject, it indicates its object in another way. For it cannot be the subject of that symbolic proposition unless it is intended and understood to be so. Its merely being an index of the flower is not enough. It only becomes the subject of the proposition, because its being an index of the flower is evidence that it was *intended* to be. In like manner, all ordinary propositions refer to the real universe, and usually to the nearer environment. Thus, if somebody rushes into the room and says, 'There is a great fire!' we know he is talking about the neighbourhood and not about the world of the *Arabian Nights' Entertainments*. It is the circumstances under which the proposition is uttered or written which indicate that environment as that which is referred to. But they do so not simply as index of the environment, but as evidence of an intentional relation of the speech to its object, which relation it could not have if it were not intended for a sign. The expressed subject of an ordinary proposition approaches most nearly to the nature of an index when it is a proper name which, although its connection with its object is purely intentional, yet has no reason (or, at least, none is thought of in using it) except the mere desirability of giving the familiar object a designation. Among, or along with, proper names we may put abstractions, which are the names of fictitious individual things, or, more accurately, of individuals whose being consists in the manner of being of something else. A kind of abstractions are individual collections, such as the 'German people.' When the subject is not a proper name, or other designation of an individual within the experience (proximate or remote) of both speaker and auditor, the place of such designation is taken by a virtual precept stating how the hearer is to proceed in order to find an object to which the proposition is intended to refer. If this process does not involve a regular course of experimentation, all cases may be reduced to two with their complications. These are the two cases: first, that in which the auditor is to take any object of a given description, and it is left to him to take any one he likes; and, secondly, the case in which it is stated that a suitable object can be found within a certain range of experience, or among the existent individuals of a certain class. The former gives the *distributed* subject of a *universal* proposition, as 'Any cockatrice lays eggs.' It is not asserted that any cockatrice exists, but only that, if the hearer can find a cockatrice, to that it is intended that the predicate shall be applicable. The other case gives the *undistributed* subject of a *particular* proposition, as 'Some negro albino is handsome.' This implies that there is at least one negro albino. Among complications of these cases we may reckon such subjects as that of the proposition, 'Every fixed star but one is too distant to show a true disk,' and 'There are at least two points

common to all the circles osculating any given curve.' The subject of a universal proposition may be taken to be 'Whatever object in the universe be taken'; thus the proposition about the cockatrice might be expressed: 'Any object in the universe having been taken, it will either not be a cockatrice or it will lay eggs.' So understood, the subject is not *asserted* to exist, but it is well known to exist; for the universe must be understood to be familiar to speaker and hearer, or no communication about it would take place between them; for the universe is only known by experience. The particular proposition may still more naturally be expressed in this way, 'There is something in the universe which is a negro albino that is handsome.' No doubt there are grammatical differences between these ways of stating the fact; but formal logic does not undertake to provide for more than one way of expressing the same fact, unless a second way is requisite for the expression of inferences. The latter mode is, on the whole, preferable. A proposition may have several subjects. Thus the universe of projective geometry being understood, it is a true proposition that 'Whatever individuals A, B, C, and D may be, there are individuals E and F, such that whatever individual G may be, there is an individual H, and an individual I, such that, if A, B, C, and D are all straight lines, then E and F are straight lines, each intersecting A, B, C, and D, and E and F are not coincident; and if G is a straight line, not coincident with E, and not coincident with F, and if G intersects A, B, and C, it does not intersect D, unless H is a one-sheeted hyperboloid of which A, B, C, and D are generators, and J is a set of generators of H, to which A, B, C, and D all belong'; or, in our usual phraseology, any four straight lines in space are intersected by just two different straight lines, unless these four straight lines belong to one set of generators of a one-sheeted hyperboloid. Such a proposition is called a relative proposition. The order in which the selection of individuals is made is material when the selections are different in respect to distribution. The proposition may relate to the frequency with which, in the course of ordinary experience, a generic event is of a certain species. De Morgan wishes to erect this into the general type of propositions. But this is to overlook a vital distinction between probability and that which a universal proposition asserts. To say that the probability that a calf will not have more than six legs is 1, is to say that in the long run, taking calves as they present themselves in experience, the ratio of the number of those with not more than six legs to the total number is 1. But this does not prevent there being any finite number of calves with more legs than six, provided that in the long run, that is, in an endless course of experience, their number remains finite, and does not increase indefinitely. A universal proposition, on the other hand, asserts, for example, that any calf which may exist, without exception, is a vertebrate animal. The universal proposition speaks of experience distributively; the probable, or statistical proposition, speaks of experience collectively. (C.S.P.)

Subject (of experiment): one upon whom a psychological experiment is made.

Other terms in use are 'reagent' and 'reacter' (not recommended), though in a more restricted sense. Cf. also SENSITIVE, and MEDIUM. (J.M.B.)

Subject-consciousness. That phase of consciousness which has objects. See SUBJECT (3), and Subject-self under SELF. (J.M.B.)

Subjective Selection [not in use in the other languages]: see SELECTION (in psychology). The function of selection by or through consciousness, considered as aiding in the survival of the creature which exercises it.

Used by James Ward (*Encyc. Brit.*, 9th ed., art. 'Psychology') as a function of accommodation to and selection of the creature's living environment; and later (*Naturalism and Agnosticism*) as a factor in the evolution of the species. Ward cites ORGANIC SELECTION (q. v.) as invoking the principle along similar lines (ibid.), but his article in the *Encyc. Brit.* does not seem to make use of subjective selection as a factor of 'determination' in the theory of descent. Cf. also 'conscious' SELECTION (in biology). (J.M.B., G.F.S.)

Subjective Sensations: Ger. *subjektive Empfindungen*; Fr. *sensations subjectives*; Ital. *sensazioni subiettive.* Sensations of the special senses arising independently of a stimulus external to the organism.

The use of the term 'subjective' in this connection is open to grave objection. The 'subject' referred to is not the psychological subject or 'self,' but the body as distinguished from its environment. We speak of the retina's own light to denote those visual sensations which arise independently as extra-organic stimulus. Perhaps we might extend

this usage and speak of the ear's own sound, and in general of the 'own' sensations of the various special senses. (G.F.S., J.M.B.)

As illustrating the German usage, cf. the 'subjektive Linien' of Schumann, *Zeitsch. f. Psychol.*, xxiii. 4. (K.G.)

Subjectivism [for deriv. see SUBJECT]: Ger. *Subjektivismus*; Fr. *subjectivisme*; Ital. *soggettivismo*. (1) The theory which denies the possibility of objective knowledge, which limits the mind to consciousness of its own states; as such, equivalent to subjective idealism.

(2) Any theory which attaches great importance to the part played by the subjective factor in constituting experience; e.g. Kantianism in its doctrine of the subjective origin of the forms of perception (space and time) and the categories of conception.

(3) The theory, in ethics, which conceives the aim of morality to be the attainment of states of feeling, pleasure or happiness (Külpe, *Intr. to Philos.*, sects. 14, 30). Cf. OBJECTIVISM.

Subjectivistic products of all sorts (no less than the producers) are said to have 'subjectivity.' (J.D.)

Subjectivity (the, in theology): Ger. *Subjektivität*; Fr. *subjectivisme*; Ital. *soggettivismo*. (1) That tendency which seeks the organ and criteria of religious truth in the intimations of the inner consciousness rather than in history and objective revelations.

The subjective tendency dominates mysticism as distinguished from scholasticism and rationalism; also quietism and all forms of religious profession in which the last appeal is to the inner spirit. The schools of Schleiermacher and Ritschl are subjective in their appeal to Christian consciousness as the immediate source of religious truth. But they are saved from pure subjectivity: Schleiermacher, by his appeal to the historic consciousness of a religious community, and Ritschl, by his appeal to a historic Christ. (A.T.O.)

(2) Any thought which explicitly adopts or defends the subjective standpoint or method has the character of subjectivity; see SUBJECTIVISM. (J.M.B.)

Subject-self: see SELF.

Sublation [Lat. *sub* + *ferre*, to bear]: Ger. see below; Fr. *enlèvement*, *suppression*; Ital. *soppressione*. (1) Removal.

(2) A word proposed to translate Hegel's 'Aufheben.' 'Superseding' has also been suggested. See HEGEL'S TERMINOLOGY, Glossary, 'Aufheben.' (C.S.P.)

Sublime [Lat. *sublimis*, lofty]: Ger. *erhaben*; Fr. *sublime*; Ital. *sublime*. An aesthetic value in which the primary factor is the presence or suggestion of transcendent vastness or greatness, as of power, heroism, extent in space or time.

It differs from greatness or grandeur in that these are as such capable of being completely grasped or measured; whereas the sublime, while in one aspect apprehended and grasped as a whole, is yet felt as transcending our normal standards of measurement or achievement. Hence two elements emphasized in varying degree by different writers, and probably varying in different observers: (1) a certain baffling of our faculty with feeling of limitation, akin to awe and veneration; (2) a stimulation of our powers and elevation of the self in sympathy with its object.

The element of magnitude in beauty was noted by Aristotle, and given by him a prominent place in tragedy; but the earliest extant determination of the sublime as a distinct conception is in the treatise περὶ ὕψους ascribed to Longinus, but now supposed to be of earlier date (1st century A.D.). In modern times it was given especial prominence by Burke (*Essay on the Sublime and Beautiful*, 1756) and Home (*Elements of Criticism*, 1761), who sought a psychological and physiological explanation.

According to Burke it is caused by 'a mode of terror or pain,' and is contrasted with the beautiful—not a part of it. Kant also distinguished it as a separate category from beauty, making it apply properly only to the mind, not to the object, and giving it a peculiar moral effect in opposing 'the interests of sense.' He distinguished a 'mathematical' sublime of extension in space or time, and a dynamical of power. Most subsequent writers on aesthetics have tended to bring the sublime within the beautiful in the broader sense, i.e. have recognized its aesthetic quality as closely related to beauty.

Literature: KANT, Critique of Judgment, §§ 23 ff.; SEIDL, Gesch. d. Erhabenheitsbegriffs seit Kant (1889); FECHNER, Aesth., xxxii; G. ALLEN, Origin of the Sublime, Mind, iii. 324; SULLY and BAIN, Psychologies; RIBOT, Psychol. des Sentiments (1896), 339 ff. Nearly all the works on aesthetics cited under AESTHETICS and BEAUTY treat the sublime. (J.H.T.)

Subordination (or **Inclusion**, in logic)

[Lat. *sub* + *ordo*, order]: Ger. *Subordination*; Fr. *subordination*; Ital. *subordinazione*. The relation of a smaller or 'lower' to a larger or 'higher' logical class, as of species to GENUS (q. v., in logic). Cf. DIVISION. (J.M.B.)

Subpotency: see PREPOTENCY.

Subsidy [Lat. *subsidium*, a reserve]: Ger. *Subvention*; Fr. *prime, subvention*; Ital. *sussidio*. (1) Older use: a tax granted to meet an emergency, not forming part of the regular budget.

(2) Modern use: payment of public money for a purpose of public importance; especially in aid of shipping or other transportation enterprises.

A subsidy in its modern sense differs from a 'bounty' chiefly in the fact that the public purpose is more distinctly emphasized. Subsidies for shipping are generally accompanied with the condition that the ships of the subsidized lines may be used as transports in case of war, or even armed as cruisers.

Subsidies take many different forms. In England they are given in the shape of mail contracts; and the example of England has been followed by the United States, Germany, and Italy. In France the subsidy is in the form of a mileage allowance for running ships under the national flag, combined with a premium for building the ships in home yards. (A.T.H.)

Subsistence [Lat. *subsistentia*, trans. of Gr. *οὐσίωσις*]: Ger. *Subsistenz*; Fr. *subsistance*; Ital. *sussistenza*. (1) In scholastic thought: the sort of existence of substance in relation to its accidents, the substance being the substratum, the *τὸ ὑποκείμενον* or 'bearer' (Träger) of the accidents. See LATIN AND SCHOLASTIC TERMINOLOGY (11), and cf. Eisler, *Wörterb. d. philos. Begriffe*, 'Subsistenz.'

(2) Used loosely as equivalent to existence. (J.M.B.)

Substance [Lat. *sub*, under, + *stare*, to stand]: Ger. *Substanz*; Fr. *substance*; Ital. *sostanza*. (1) Essence: the important characteristic or constitutive elements in any subject.

(2) Any individual real thing; an entity.

(3) The generalized reality which is manifested in a variety of particular things.

(4) The reality which underlies the properties in any thing, whether mental or material; unknown, while they are known; substrate. The properties have an ambiguous reference: on the one hand, they are supposed to inhere in the substance; on the other, they are simply the impressions which the unknown substance makes upon our senses; they stand, therefore, with one leg in the object and another in the subject.

SUBJECT (q. v.) and ESSENCE (q. v.) in the early history of the term substance largely divide its meaning between them. Aristotle had used the term *οὐσία* in ways which certainly appear incompatible. On the one hand, it is the concrete, individual thing; it is asserted that it is not possible for it to be the universal—this when he is opposing Platonism. On the other hand, he declares that all science and knowledge are of the universal. Again, it is the mixture, or concrete, of matter and form, the universal realized through being merged in the particular. And again, the substrate or subject (*ὑποκείμενον*) is sometimes defined as pure indeterminate matter. If it is too much to say that the scholastics rolled these meanings into one, they certainly confused substance as individual thing with essence as the real being, or form, found in particular things, and thus prepared the way for the triple modern sense. (1, above) As essence it is the universal and determining real—Descartes and Spinoza—the substantial, as distinct from the attributive or accidental. (4, above) As that which underlies particular things and qualities, it indeed exists, but is unknown; it is simply that which serves as a background and cause, utterly inaccessible in its real nature—Locke and the popular philosophy derived from him—akin to Kant's thing-in-itself. (2, above) Any individual thing or object, having its highest philosophical expression in Leibnitz's monadism. Berkeley acutely sees that Locke's substance is only an abstract idea, and as such, according to his nominalism, meaningless, and so abolishes the substance, matter. Hume repeats the operation upon mind as substance. Kant gives a new meaning to it—that which persists in quantity through a series of temporal changes. See PERMANENCE. (J.D.)

History. (1) The history begins with the assumption of Thales that there is one permanent existent; and he and the other Pre-Socratic philosophers may certainly be said to have conceived their *ἀρχαί* as substances, although they never thought to define expressly the relation in which these stood to their changing forms, and had consequently no name to express this relation. The conception of the *ἀρχή* resembles that of substance, not only in that it is permanent, but also in its affinity to the conception of CAUSE (q.v.,

History), and in that it seems to have been considered to exist more really than the temporary: the latter perhaps is hardly conceived as non-existent, but yet it is of the ἀρχή that you really predicate everything which you seem to be predicating of a complex thing; everything that exists *is* the ἀρχή. Moreover, there already arises in this period the question whether there is more than one substance; some philosophers holding that there are several, each differing from the other in quality, but permanent and unable to change into the other, whereas the atomists have already reached the conception of a plurality of substances, similar in quality but distinguished by their spatial positions. Plato may be said to have conceived his 'ideas' as substances, since he conceives them as existing, as eternal, as immutable, as the only real existents, and as the causes of all other things. With Aristotle begins the history of the notion 'substance' as an object of definition. The term ὑποκείμενον, of which the Latin translations *suppositum*, *substratum*, and sometimes *subiectum*, were used as equivalent to *substantia* at the beginning of modern philosophy, is used by him in two senses: (*a*) ὑποκειμένη ὕλη, which denotes that which has the properties possessed by the ἀρχαί of the Pre-Socratic philosophers; (*b*) the subject of a proposition. The logical subject he generally conceives as something complex, constituted by the union of that essence or form, to which Plato had ascribed ultimate reality, with ὕλη; and it is to this complex that he ascribes the independence (πρώτη οὐσία) usually taken to characterize substance. [The first statement (*a*) holds of Aristotle's conception of material things; the statement as a whole does not hold, e.g., of the ultimate οὐσία, the Deity, of Bk. Λ of the *Met.* See especially the οὐσίαι ἄνευ ὕλης of c. 6, 1701 b 10, and cf. c. 8, 1074 a 31 f. τὸ δὲ τί ἦν εἶναι οὐκ ἔχει ὕλην τὸ πρῶτον· Ἐντελέχεια γάρ. See Zeller, *Arist.*, 362 ff. Moreover, πρώτη οὐσία is not Aristotle's terminus for 'ultimate reality,' though any οὐσία καθ' αὐτό would be an instance of πρώτη οὐσία; for καμπυλότης = καμπυλότητι εἶναι is given as an illustration of οὐσία πρώτη, in *Met.* 7, 1037 b 2. Cf. Schwegler's note, in loc.—H.N.G.]

Aristotle thus conceived substance as the essential qualities of a thing, distinguished from their essence by the fact that they exist—a fact which he identifies with their union with ὕλη; and his theory thus falls between two stools, since he partially holds the analytic view of predication, in which the subject is the whole complex thing, but on the other hand rejects part of the attributes which constitute the complete definition of an individual, as mere accidents (συμβεβηκότα), without, however, carrying this process so far as to make the permanent ὕλη ultimate subject. He thus makes it difficult to distinguish substance from essence, and even seems sometimes to speak himself as if, with Plato, he regarded the essence as πρώτη οὐσία. This term is not, however, one of the cardinal terms in his philosophy. The exact Greek equivalent of the Latin *substantia* (ὑπόστασις) seems first to occur as a regular technical term in the Neo-Platonists, with whom it appears to denote the complete definition of an individual, thus carrying out to its logical conclusion the Aristotelian conception of a complex ultimate subject. Curiously enough, however, in the doctrine of the Trinity, ὑπόστασις is the Greek equivalent of the Latin *persona*, whereas οὐσία is rendered by *substantia*.

Thus the confusion between substance and essence, which naturally results from the Aristotelian doctrine of a complex subject, seems to culminate in a complete change of place between substance and essence. Accordingly, from the beginnings of modern philosophy, *substantia*, *suppositum*, and *substratum* are all used as equivalents, and denote both the ultimate logical subject and that which is permanent through change. Descartes, upon these lines, distinguishes two substances, extension and thought, which he considers to be marked out as such by their almost complete causal independence of each other. He cannot, however, consistently with theological orthodoxy, refuse to regard God also as a substance, and the other two as dependent upon him, but dependent in some different way, which is not defined, but for which the term is 'creation,' from that in which a finite effect depends upon its cause. His school generally regarded mind and matter as completely independent of each other, and recognized the anomalous position of God in their definition of substance, defined as 'that which needs the concurrence of God only for its existence.' Spinoza, more consistently, makes God the only substance, defining substance as 'causa sui' or as 'quod in se est et per se concipitur.' Thus extension and thought are reduced by him to two among God's infinite attributes, but it is not explained in what way, if any, God differs from the sum of his attributes: he even speaks of 'Deus

sive omnia eius attributa.' Leibnitz defines substance as the ultimate logical subject, and holds that there are an infinite number of substances, each independent of all the rest, but all, nevertheless, dependent upon God.

Locke, Berkeley, Hume tend to regard substance merely as a name for the form in which sensible qualities are combined, and to minimize the importance of the conception; Berkeley, however, allows that the soul is a substance, but without defining what he means thereby. Kant first clearly disengages the notion of that which is permanent through change as the only meaning of substance which is applicable to the existents which we know. He seems, however, to regard the conception of the ultimate logical subject as different from this, and as the proper definition of substance, denying only that any existent conforming to this is accessible to human knowledge. In the philosophy of this century, which tends to consider all the existents known to us as largely, if not wholly, phenomenal, substance has been generally regarded merely as the unknowable real existent, upon which in some sense they depend. (G.E.M.)

Substance (in theology): Ger. *Substanz*; Fr. *substance*; Ital. *sostanza*. That which is one and immutable in being; the ground of properties and changes in things; the divine nature in its essence as transcending personal distinctions. Cf. SUBSTANCE.

The Greek term *οὐσία* is used to express the subsistent element in things and the immutable and unitary divine essence. In his being, God is one and immutable, but in his energizing the distinctions of personality arise. In the thought of the Christian writers, while personality is conceived to be less fundamental than the unitary nature of the divine, yet on the other hand it is not regarded as a mere mode of manifestation. Modalism is a heresy in Christian thought. Cf. HOMOOUSIA. (A.T.O.)

Substantialism: see SUBSTANTIALITY THEORY.

Substantiality Theory or **Substantialism** [for deriv. see SUBSTANCE]: Ger. *Substantialitätstheorie, Substantialismus*; Fr. *substantialisme*; Ital. *sustanzialismo*. (1) In general, the theory that there are real substances, or distinct entities, underlying phenomenal facts or events.

(2) Its more definite meanings depend upon, and vary with, that which it is opposed to.

(1) As opposed to phenomenalism, it asserts that substances 'mind' and 'matter' exist, and are known to exist with as much certainty as are particular physical and psychical facts.

Hamilton says: 'Philosophers, as they affirm or deny the authority of consciousness in guaranteeing a substratum or substance to the manifestations of the Ego and Non-Ego, are divided into Realists or Substantialists and into Nihilists or Non-Substantialists' (*Lect. on Metaphys.* i. 294). In a somewhat more limited sense, the term is used to denote the belief of those who hold to a separate self or soul distinct from the phenomena of consciousness, as over against that view which regards the soul as simply the sum-total of conscious activities or modes, the latter school being called 'Actualists' (so Hibben, *Problems of Philos.*, 79), and the theory 'Actuality Theory' (cf. Eisler, *Wörterb. d. philos. Begriffe*, 'Actualitätstheorie,' for numerous citations).

(2) As opposed to the dynamic theory of matter, substantialism holds that matter cannot be resolved into 'centres of force,' or modes of energy, but that mass is a necessary and irreducible concept, over and above that of motion, in considering the physical constitution of the universe. (J.D.)

Substantive and Transitive States (in psychology): Ger. and Fr. not in use; Ital. *stati mentali sostantivi e transitivi* (Ferrari). Substantive states of mind are those which represent sensible terms: nouns, verbs, adjectives, &c.; transitive states are those which represent relations: such things as are expressed by prepositions, conjunctions, &c. 'Relational states' might be a better term for the latter. (W.J.)

The terms were originally used by James, *Princ. of Psychol.*, i. 243 ff. (J.M.B.)

Substantive Law: see ADJECTIVE LAW.

Substitution (in logic) [Lat. *substitutio*]: Ger. *Substituirung*; Fr. *substitution*; Ital. *sostituzione*. (1) Most properly, the removal of a term from a proposition (not necessarily the whole subject or predicate) and the insertion of another term in its place.

The idea that reasoning consists essentially in doing this is an old one, and Jevons maintained that inductive reasoning consists in the substitution of similars. In fact, this would describe presumption, or abduction, in a general way. But there has been great confusion of induction with abduction, and of pure induction with induction affected by other kinds of considerations; cf. PROBABLE REASONING (3). The word in this sense is in wide use among logicians to-day.

(2) Writers on the logic of RELATIVES

(q. v.) follow the mathematicians in the very bad use of this word to signify the operation of changing the order of a finite series of objects, and consequently define it in logic as a totally unlimited dyadic relative of which no individual is relate to two correlates or correlate to two relates; or as a dyadic relative of which every individual is relate to just one correlate and correlate to just one relate. The mathematicians begin to show some symptoms of dissatisfaction with this ill-chosen word; so that logicians would do well to change it at once to *permutation*. Cf. MATHEMATICS, and NUMBER. (C.S.P.)

Substitution (in theology, Christian). That feature of the scheme of redemption in which Jesus Christ is represented as taking the sinner's place, and giving satisfaction for the broken law and purchasing righteousness for the sinner.

The doctrine of substitution presupposes the necessity of propitiation either by the sinner or his substitute. Jesus Christ becomes the expiatory sacrifice that satisfies the requirements of divine justice and renders the exercise of pardoning grace possible, while the obedience of Christ constitutes a righteousness which may be imputed to the sinner for his justification.

Literature: EDWARDS, Sermons on Justification by Faith alone and Wisdom displayed in Salvation, iv (Worcester ed.); ANSELM, Cur Deus Homo?; ATHANASIUS, Contra Arianos; AUGUSTINE, De Pecc. Mun.; OXENHAM, Doctrine of the Atonement (1881); SHEDD, Hist. of Christ. Doctrine; the Confessions of the Anglican, Lutheran, and Presbyterian churches. Cf. IMPUTATION, and ATONEMENT. (A.T.O.)

Substrate or **Substratum**: see SUBSISTENCE, and cf. SUBSTANCE (4), and ESSENCE.

Subsumption [Lat. *subsumptio*]: Ger. *Subsumtion*; Fr. *subsumption*; Ital. *subsunzione*. A proposition practically putting a case under a rule; as the minor premises of the first figure of SYLLOGISM (q. v.). (C.S.P.)

The 'subsumption theory' is the older logical view that the subject of a proposition is 'subsumed' under the predicate. (K.G.)

Succession and **Duration** [Lat. *sub* + *cedere*, to yield; and Lat. *durare*, to last]: Ger. (1) *Aufeinanderfolge*, (2) *Dauer*; Fr. (1) *succession*, (2) *durée*; Ital. (1) *successione*, (2) *durata*. Duration and succession are correlated aspects of CHANGE (q. v., 2) in that in which individual IDENTITY (q. v.) is presupposed.

The identity is such as to include in the unity of an object, recognized as the same or different, determinations which cannot be present together. These determinations are then said to succeed each other, and the object which they qualify is said to endure or to have duration. See TIME, TIME PERCEPTION, and TIME SENSE. (G.F.S.–J.M.B.)

The successive determinations of the identical object all form part of its being, irrespective of the question whether they have taken place, are now taking place, or are going to take place. So long as it has not changed in those characters which give it unity and continuity of interest for the subject attending to it, and so constitute it an individual identity for this subject, all its other temporal vicissitudes are integral constituents of its total existence. When it has once changed in those characters which constitute its individual identity, it cannot change any more, because it has ceased to exist. But all other changes are part and parcel of its individual unity, as truly as legs, seat, and back are parts of a chair. We must therefore refuse to accept Kant's dictum that 'only the unchanging changes.' Kant appears to have divided the changing object into two parts, one remaining *materially* identical, i. e. indistinguishably alike, and the other consisting in a series of differences arising and disappearing after one another. On this view the difference cannot be said to change; they only succeed each other. Kant infers that it is the materially identical element or the 'unchanging' which changes. This is not merely a paradox; it is a real absurdity, which only disappears when we substitute the conception of individual for that of material identity.

A materially identical object may *endure* although it does not change. But its duration is always apprehended in relation to some other object (or objects) which does change. The changes necessary to the apprehension of its duration may be merely the sequence of moments of time in the abstract, or they may be merely changes in the psychical state of the subject which takes cognizance of it. (G.F.S.)

Succubus [ML. *succubus*, from *sub* + *cumbere*, to lie]: Ger. *Succubus*; Fr. *succube*; Ital. *succubo*. An alleged nocturnal demon consorting with human beings.

Witches were tried and convicted of producing offspring through such agency. Cf. WITCHCRAFT. (J.J.)

Suffering [Lat. *sub* + *ferre*, to bear]: Ger.

Leiden; Fr. *souffrance*; Ital. *dolore, patimento.* (1) Continued PAIN (q. v.) or UNPLEASANTNESS (q. v.).

(2) Sometimes used instead of passion as a translation of *παθεῖν* (pati), one of the CATEGORIES (q. v.) of Aristotle. (J.M.B.)

Sufficient Condition and **Indispensable Condition** (in logic). See NECESSARY AND SUFFICIENT CONDITION.

Sufficient Reason: Ger. *Satz vom zureichenden Grund*; Fr. *principe de raison suffisante*; Ital. *legge della ragione sufficiente.* (1) This phrase was made a term of philosophy, if not invented, by Leibnitz. In the *Principes de la Nature et de la Grâce*, he says (but this is far from being the first time in which he signalizes the principle): 'It is necessary to resort to metaphysics and to make use of a *great principle*, not much employed, to the effect that nothing takes place without reason (*rien ne se fait sans raison suffisante*); that is to say, that nothing occurs for which one having sufficient knowledge might not be able to give a reason sufficient to determine why it is as it is and not otherwise.'

It is impossible to understand what Leibnitz means by this, without careful study of his works. There are two difficulties. In the first place, Leibnitz confounded under this phrase two entirely different ideas which he failed to discriminate. In the second place, in order to understand Leibnitz's position here, it is necessary to take into account, on the one hand, the thorough individualistic nominalism, with which he began his philosophical life and never consciously surrendered, and on the other hand his recognition of intellectual relations in the universe of which that nominalistic metaphysics involves the denial. His singular and complicated metaphysics is the outcome of his struggle to reconcile those two incompatible positions.

His sufficient reason is not an efficient cause, but a utility, or, in a broad sense, a final cause. But a nominalist cannot admit that an immediate final cause *exists*. Leibnitz, however, makes it *true*. For a realist, the real is nothing but the immediate object of that which is true. But Leibnitz has another notion of truth. Thus, in a letter to Arnauld (quoted in Latta's accurate and convenient exposition, p. 61, *note* beginning p. 60), he says: 'Always in every true affirmative proposition, whether necessary or contingent, universal or singular, the notion of the predicate is in some way comprehended in that of the subject, *praedicatum inest subiecto*; otherwise I know not what truth is'; and in other passages he shows that for him truth is a relation between notions. Yet, as a nominalist, he could not hold that those notions immediately correspond to anything real. Consequently, he does not say that there really is a sufficient reason, but that anybody favourably situated would be able to render a sufficient reason. There is nothing real that corresponds to it immediately. Remotely, the purpose of God may correspond to it. Thus, the world of reality and the world of truth are completely sundered; for the former, Leibnitz is a pure individualistic nominalist; for the latter, on the contrary, he is an intellectualist. When he says, for example, that that which has no sufficient reason is 'necessarily' non-existent, he uses the adverb of logical not of metaphysical modality. He does not hold that real things are either emanations or entelechies of anything corresponding to a sufficient reason, but that is how the mind is affected. But when he comes to the ultimate sufficient reason of contingent truths, which is God, he ceases to draw the distinction between the world of thought and the world of being; and this exception introduces difficulties into his system. But Leibnitz confounds two things under his word 'reason.' The idea which principally governs his doctrine is that a reason is an explanation of the utility of that of which it is a reason; but he includes under the same word any explanation of the logical necessity of the object, the why it follows from a general law. Hence, in many cases, his sufficient reason fulfils the function of an efficient cause. It would be quite possible to quote passages from Leibnitz which conflict with this account of his conception. In order that the reader should apprehend it as he did, it would be requisite that his mind should be in the same unclear condition, which is not possible after one has once attained a superior grade of clearness. We can account for his implicit contradictions, but cannot reproduce his apprehension of them when we once see them to be contradictions.

It is to be remarked that Renouvier and Prat, in their rehabilitation of Leibnitzianism, reject the principle of sufficient reason (*La Nouvelle Monadologie*, 41, note 29).

The principle of sufficient reason may very well be understood to express our natural expectation or hope to find each unexpected phenomenon to be subject to reason and so to be intelligible. But to entertain this hope for *each* is not necessarily to entertain it for

all. At any rate, it is easy to see that, however strong the tendency may be, it does not amount to any such absolute and inductable necessity as attaches to the law of contradiction, by the side of which Leibnitz and many Germans have placed it. Moreover, however important this tendency of thought and this truth about the universe may be in reference to the development of science, nevertheless, like the principle of the uniformity of nature, its strictly logical application to add force to arguments is very limited indeed. The *modus ponens* and *modus tollens* stand in no need of any such general principle to be perfectly apodictic. It is essential to no broad division of reasoning. As a general rule, when we infer that a particular phenomenon, or set of phenomena, which seemed surprising at first, is to be explained as a consequence of a fact or law not directly observable, the argument is not appreciably strengthened by a separate assumption that the phenomenon has *some* explanation; although there are special cases in which it can be fortified by a similar, but more definite, premise. (C.S.P.)

(2) In logic: 'Every act of thought requires or presupposes another act of thought upon which it is based' (Eisler). This is made one of the fundamental laws of thought by earlier German writers, but English writers do not in general enumerate it as such.

It is more properly regarded as a principle of psychology—the mind requires some ground for its acceptance of any proposed proposition; but this has nothing to do with logic as such. It is hardly a general principle, and when it is active it is incomplete. The non-thinking mind accepts propositions as given to it, and asks for no reasons; if a mind is alert, it seeks not only for the reasons but also for the consequences of things. Every proposition is a centre for backward and forward streamers—the things which prove it and the things which it proves, and one function is no more fundamental and no more compelling than the other. Some propositions are richer in consequences, some excite us more to look for their antecedents; our moral, spatial, and logical intuitions have for us many consequences but no antecedents. The final proposition in which we shall sum up all that it is possible to know about the universe will have very complex grounds for its validity, but it will have no consequences. If the so-called principle of sufficient reason needs to be formulated at all, it should have standing side by side with it the principle of invariable consequence; here is exhibited, as everywhere else, the fundamental quality of thinking, its duality. Both axioms, in their objective expression, might be expressed in one in the sentence: *Occurrences in the world are linked together in series*; or, *Reasoning is possible.* (C.L.F.)

The principle has played a great rôle in philosophy, many great philosophers taking a hand at giving it formulation. Perhaps the most famous after Leibnitz is Schopenhauer (as below), who develops a 'fourfold root' of the principle, i. e. (1) 'law of reason for Becoming' (principium rationis sufficienter fiendi); (2) 'law of reason for Knowledge' (prin. rat. suff. cognoscendi); (3) 'law of reason for Being' (essendi); (4) 'law of reason for Conduct' (agendi), or 'law of Motivation.' These formulations are also given (in detail), together with many citations from other philosophers and logicians, by Eisler, *Wörterb. d. philos. Begriffe*, 'Grund (Satz vom).' (J.M.B.)

Literature: LATTA, Leibniz (1898); URBAN, Hist. of the Princ. of Suff. Reason, Princeton Contrib. to Philos., i (1898); and Psychol. Rev., iv. (1897) 361; the Histories of Philosophy, 'Leibniz'; SCHOPENHAUER, Die vierfache Wurzel d. zureichenden Grundes; systematic works on logic. (C.S.P., J.M.B.)

Ṣúfiism [Arab. *Taṣawwuf*, the becoming or being a *Ṣúfí*. The word is from *ṣúf*, 'wool'; the equivalent *pashmína-púsh*, 'clad in wool,' occurring commonly in Persian. Attempts to connect it with *σοφός* in the West, and with the Arabic root *ṣafá*, 'purity,' in the East, must be regarded as purely fanciful. Woollen clothing typifies adherence to the primitive simplicity enjoined by Islám, and rejection of the pomps, vanities, and luxuries of the world; a fact clearly brought out by the historian al-Mas'údí in his account of the 'orthodox caliphs,' especially in what he says of 'Umar]: Ger. *Ssufismus*; Fr. *Soufisme*; Ital. *Sûfismo*. The more or less pantheistic and idealistic system of mysticism prevalent in Muḥammadan countries, especially in Persia.

According to their own view, the Ṣúfís are simply esoteric Muḥammadans, holding the essential, inner doctrine which lies at the root of Islám. The pantheistic idealism which, more or less clearly, the extreme Ṣúfís profess, is based on certain verses of the Qur'án, such as 'Thou didst not shoot when thou didst shoot, but God shot' (alluding to the Muḥammadan archers at the Battle of Bedr); and on certain

traditions, such as 'God was, and there was nothing beside Him,' and 'I was a Hidden Treasure, and I desired to be known, so I created the Universe that I might be known.' Western writers have been disposed to refer Ṣúfíism to Indian influences (Buddhism, Vedánta sára) or to Christian influences (a thesis maintained by Whinfield); but so far as it was not an entirely independent growth—the natural reaction of an emotional piety against the formalism of orthodox Islám—it probably owes more to Neo-Platonism than to any other previous system. This point has been admirably worked out by R. A. Nicholson in the Introduction to his *Selected Poems from the Dīvān-i-Shams-i-Tabrīz*. Plotinus and the other Alexandrians were well known to the Arabian philosophers of the early 'Abbásid period, even if their ideas were not introduced into Persia in the 6th century of our era by the Neo-Platonist refugees at the court of Núshírwán, the Sásánian king. Of course, as already hinted, no such external influences are admitted by the Ṣúfís themselves, who consistently represent themselves as the repositories of the esoteric teaching of the Prophet and his Companions.

In its earlier form (2nd and 3rd centuries after the Flight) the ascetic and ethical sides of Ṣúfíism were most prominent, and quietism, non-resistance, and a passionate love of God were its most conspicuous features; while the metaphysical, speculative, and pantheistic elements seem to have been superadded at a rather later date under the influence of the so-called Arabian philosophy. The original character of the movement is still commemorated by the various orders of dervishes (Pers. *darvish* = Arab. *faqír*, 'poor') or religious mendicants who abound in the Muḥammadan East, and of whom many (especially in Sunnite countries, like Turkey) are pretty orthodox, in contradistinction to the '*urafá*' (pl. of '*árif*, 'Gnostic') of Persia, who, often undistinguished by any particular garb or distinctive token, are generally thoroughgoing pantheists.

The general theory of the Ṣúfís as to the nature of God, the universe, and man is as follows. From the philosophical point of view, God is pure Being, the Necessarily-Existent (*Wájibu'l-wujúd*); from the ethical, Absolute Good (*Khayr-i-maḥz*); from the aesthetic, the Eternal Beauty. Now, since the essential nature of beauty is to desire the revelation or manifestation of its attributes and perfections, God caused his reflection to fall on the mirror of not-being (*'adam*), and the reflection thus produced is the phenomenal world or contingent being (*imkán*), which reveals the attributes of God, but does not partake of his substance, being, in fact, a mere phantasm. Of this reflection man is, as it were, the eye. When he loves wisdom, beauty, or goodness, he in reality loves God, and when he recognizes this, and realizes that God is the only reality, he is able to overleap, as it were, his own limitations, and attain the stage of annihilation in God (*faná fí'lláh*), which is the goal of the Ṣúfí adept or Gnostic. This stage is only reached by a severe spiritual discipline—first an attentive observance of the Sacred Law (*Sharí'at*), and then by a patient following of the mystic path (*Ṭaríqat*), which ultimately leads to a knowledge of the truth (*Ḥaqíqat*). Evil is regarded merely as the negation of good, just as darkness is a mere absence of light, not a separate entity. 'There is no absolute evil in the universe,' says the great mystic Jalālu'd-Dīn Rūmī; 'Evil is only relative: recognize this also.'

As with many other mystics, the erotic character of many utterances of the Ṣúfís, especially their poems, is very pronounced, so much so that it is often impossible to separate the allegorical from the literal meaning, especially in the case of lyric poets like Háfiẓ, with whom Ṣúfíism was rather a literary fashion than a profound conviction. The Ṣúfís, moreover, can hardly be regarded as a sect of Islám; their emotional, semi-philosophic, pantheistic idealism is rather a mental habit than a distinctive doctrine, and the very nature of that habit is opposed to any external organization or desire to proselytize. 'The ways unto God,' they say, 'are as the number of the souls (or "breaths") of men'; and they commonly regard all religions as embodiments, more or less clear, of the same central truths. 'All this turmoil and trouble in the world,' says Jámí, 'are from love of him; it hath now become known that the source of this strife is one.' Latitudinarianism and individualism are essential features of the Ṣúfí doctrine, which is therefore looked on with disfavour not only by orthodox Muḥammadans, but also by heterodox sects like the Bábís.

Literature: Tholuck, Ssufismus sive Theosophia Persarum Pantheistica (1821), and Blüthensammlung aus der morgenländischen Mystik (1825); Gobineau, Religions et Philosophies dans l'Asie Centrale, chap. iv

(2nd ed., 1866; 3rd ed., 1900); A. von Kremer, Gesch. d. herrschenden Ideen des Islams (1868), Bk. I. chaps. v–viii, Bk. II. chap. iv; Culturgeschichtliche Streifzüge auf dem Gebiete des Islams (1873); and Sur les Soufis, in the Journal Asiatique for Feb.–March, 1868, 271 ff.; Dugat, Philos. et Théologiens musulmans (1878); R. A. Vaughan, Half-hours with the Mystics, Bk. VII, 'Persian Mysticism in the Middle Age' (1856 and later editions); Sir James Redhouse, The Mesnevī of Jelālu'd-Dīn (1881), trans. of the first book into verse; E. H. Whinfield, The Masnavī-i-Ma'navī of Jalālu'd-Dīn Rūmī, trans. and abridged (2nd ed., 1898); ibid., The Gulshan-i-Ráz, or Mystic Rose Garden, of Sa'du'd-Dīn Maḥmūd Shabistarī, edited with trans. and notes (1880); Vincenz Edlem von Rosenzweig, Jāmī's Yūsuf wa Zulaykhā, Persian text and German metrical trans. (1824); Garcin de Tassy, text and trans. of Farīdu'd-Dīn 'Aṭṭār's Mantiqu'ṭ-Ṭayr, or 'Language of the Birds' (1863); R. A. Nicholson, Selected Poems from the Dīvān-i-Shams-i-Tabrīz (1898); articles on Ṣūfīism in T. W. Beale's Oriental Biog. Dict. (1881), Hughes's Dict. of Islam (1885), and Religious Systems of the World, by various authors, ed. by Coupland (3rd ed., 1895). (E.G.B.)

Suggestion (and **-tibility**) [Lat. *suggestio*, from *sub* + *gerere*, to bear]: Ger. *Suggestion*; Fr. *suggestion*; Ital. *suggestione*. (1) Association (q. v.) of ideas: a meaning now generally abandoned.

(2) The coming into the mind from without of a presentation, idea, or any sort of intimation having meaning for consciousness, which effects a lodgment and takes the place it would have if internally aroused by association.

This definition is the broadest possible, making the differentia of suggestion the source of its coming—from without—rather than any peculiarity after it has come into consciousness. This follows Janet (who, however, defines only 'verbal' suggestion) as against Wundt, who defines suggestion by its results. (A collection of definitions and their critical examination by the writer will be found in the work cited below.)

Among the more important facts connected with suggestion are (1) the abruptness with which the mental flow is disturbed by the incoming presentation, and the prompt reaccommodation of the mental 'mass' to the new situation; (2) a certain 'narrowing of consciousness' (Engerung des Bewusstseins) upon the suggested elements, so that direct and restricted motor discharges with muscular movement are more likely to follow; (3) this impairs the normal system with its balance and inhibition, and the higher faculties which depend upon such a synthesis of materials are crippled or held in abeyance; there is thus lack of the ordinary coefficients of belief, lack of the synthesis of free attention, and loss of deliberation and the most capable choice.

It is these effects of suggestion, so thoroughgoing in the mental life, which has made its investigation important in recent psychology. It was first worked out in connection with Hypnosis (q. v.) and hypnotism (the 'suggestion' theory of the Nancy school). Hypnosis is a state of prolonged or fixed openness to suggestion, called 'suggestibility.' It is through the possibility of keeping consciousness in this condition—itself effected by the suggestion of it—that the nature and workings of suggestion were made the subject of prolonged and repeated experimentation. The results have been gradually brought over into the normal mental life, and suggestion found to belong to the 'rib-structure'—the real skeleton—of mind.

Among the many distinguishable phases of suggestion—apart from Hypnosis (under which see 'auto-suggestion,' 'deferred suggestion,' 'criminal suggestion,' and 'suggestive therapeutics'), which illustrates them all—are (1) sensori-motor suggestion, movement due to a suggested sensation; (2) ideo-motor suggestion, movement due to a suggested idea; (3) motor-suggestion as such, direct suggestion of movement; (4) sensory suggestion, the suggestion of sensory experience (e. g. that a red light is green); (5) ideal suggestion, suggestion of thoughts, beliefs, &c.; (6) personality suggestion, the peculiar suggestive influence of persons as such; (7) contrary suggestion, the production of effects—actions notably—the contrary of those properly due to what is suggested; (8) negative suggestion or suggestive inhibition, the removal of something from consciousness by suggestion; (6) organic suggestion, the successful suggestion of organic effects; (10) hysterical suggestion, the suggestive conditions of Hysteria (q. v.); (11) social suggestion, the normal acceptance of 'hints'—and more than hints—from the social *milieu*; (12) imitative suggestion, suggestibility to models and copies of all sorts for imitation.

The limits of suggestion in the direction of the 'outside' stimulation which it involves are found in the fact of ordinary truthful experience, which is, of course, just this kind of stimulation: it is hard therefore to draw any line between them. So while the term has been used (by Brown) for association of ideas, said to 'suggest' one another, it has also been used for the incorporation of experience in the system of the mental life (cf. Relative Suggestion). It shades off at both ends. And if we demand some mark to distinguish suggestion from ordinary experience, it is hard to find it, except as supplied by objective tests. Outside stimulation, if belonging to the normal world of experiences and not producing illusion or mal-adjustments, is 'experience'; if not fulfilling these requirements, it is 'suggestion.' Hence the tendency to confine the term to stimulations artificially produced—by other persons—which bring more or less disturbance of the normal flow of ideas. But a clap of thunder does this also! Yet there is force enough in the opposing views to lead us to consider the definition well.

Literature: that of Hypnosis (especially Bernheim; cf. also Trance, and Cataplexy); Schmidkunz, Die Suggestion; Wundt, Hypnotismus u. Suggestion; Janet, Automatisme psychologique; Baldwin, Ment. Devel. in the Child and the Race; Binet, La Suggestibilité; Lipps, Suggestion u. Hypnose (1895). See also Bibliog. G. 2, *h*. (J.M.B., G.F.S.)

Suicide [Lat. *sui*, of self, + *caedere*, to kill]: Ger. *Selbstmord*; Fr. *suicide*; Ital. *suicidio*. Intentional self-killing.

Suicide is of interest as having been made the subject both of ethical and legal disquisitions, involving questions of sanity and responsibility, and also of social and criminological study, as involving questions of contagion, motive, and hereditary endowment. Cf. Moral Statistics.

Literature: Morselli, Suicide (Eng. trans.); Durkheim, Le Suicide (1898). (J.M.B.)

Sui Generis [Lat.]. Of its own peculiar kind, singular, unique.

A phrase used to designate an individual which is the only representative or specimen of its kind, and so identical with the genus, so far as denotation is concerned. (J.D.)

Summation [L. Lat. *summare*, to add up]: Ger. *Summation*; Fr. *sommation* (*addition latente* is also used for (2)—L.M.); Ital. *addizione* (or *somma*) *degli stimoli*. A phenomenon of enhanced psychical stimulation, including (1) the superposition of stimulus effect upon stimulus effect (summation of effects), and (2) the enhancement of effect by repeated weak stimulation (summation of stimuli).

A psychological illustration of (1) is found in the grey which is seen when a disk of black and white sectors is rotated; an illustration of (2) in the experimental production of Tickle Sensation (q. v.). (E.B.T.)

In neurology, summation is a process by which two or more stimuli are united in the production of a single effect. The combination may take place in the path of the stimuli or after their entrance into the central organ. Summation may be due to retarded conductivity or limited conveying capacity, so that stimuli overtake one another. It is possible that summation occurs pre-eminently in the indirect paths of the spinal cord contained in the grey matter (cf. Spinal Cord), and this is in accord with the theory of Herrick that pain is essentially a result of summation, and Schiff's theory that pain is transmitted via the grey matter of the cord. Recent papers by Head (*Brain*, 1893–4) bring additional evidence of the connection of summation and pain by showing that afferent visceral impulses are limited, when they reach the cord, to the same segments as are concerned with heat and pain stimuli from the periphery. It thus happens that visceral pain is referred to the periphery, as it would not be if continuous tracts for pain passed to the brain. (H.H.)

Literature: Waller, Human Physiol., 331, 484; Wundt, Physiol. Psychol. (4th ed.), i. 255, &c.; James, Princ. of Psychol., i. 82, 563, &c.; Sanford, Course in Exper. Psychol., expts. 17, 31; François Franck, Les fonctions motrices du cerveau. On pain as a summation phenomenon, see von Frey, Ber. d. k. sächs. Gesell. d. Wiss. (1894), 294. (E.B.T.)

Summation Tone: Ger. *Summationston*; Fr. *son additionnel*; Ital. *suono addizionale*. The summation tone or Helmholtz' combination tone is one of the combination tones; a tone whose vibration rate corresponds to the sum of the vibration rates of the two primaries. See Combination Tone.

It is re-enforced (1) by coincident overtones, (2) by a difference tone of the second order. If n and n^1 are the vibration rates of the two primaries, the summation tone is the difference tone $2n^1-(n^1-n)$. Cf. Difference Tone. (E.B.T.)

Summists [Lat. *summa*, collection, sum]: Ger. *Summisten*; Fr. *sommistes*; Ital. *som-*

misti. A name applied in SCHOLASTICISM (q. v.) to the successors of Hugo. Their chief aim was to systematize the writings of the great teachers of the Church, and present them as a consistent whole. They thus commence, although only in a formal way, the movement towards the presentation of the content of faith in its unity with reason.

Besides Hugo, Sully, Peter of Lombard, and Alanus are the chief representatives of the school. The name is derived from the fact that Hugo wrote a work entitled *Summa Sententiarum*. See Erdmann, *Hist. of Philos.*, ii. 331–47. (J.D.)

Summum Bonum [Lat.]. HIGHEST GOOD (q. v.); see also GOOD.

Summum Genus [Lat.]. A GENUS (q. v.) which is included under no higher genus.

The predicaments of Aristotle were regarded as summa genera. It is true that being was predicated of all, but not in the same sense. (C.S.P.)

Sunnites and Shí'ites [Arab. *Ahlu's-Sunnat*, 'people of the Sunnat' or 'traditional code' (see MOHAMMEDANISM), *Ahlu'sh-Shí'a*, 'people of the sect' or 'faction' (of 'Alí)]: Ger. *Sunniten und Shí'iten*; Fr. *Sunnites et Shyytes (Chiites)*; Ital. *Sunniti e Chiiti*. The names of the two great antagonistic sects of Islám.

As explained in the article MOHAMMEDANISM (q. v.) orthodox Islám is based on (1) the *Qur'án*, or Word of God; (2) the *Ḥadíth*, or words of the Prophet; (3) the *Sunnat*, 'code' or practice of the Prophet and his immediate followers; the two last being a collected and critically edited body of traditions, each vouched for by a chain of veracious and trustworthy authorities (*isnád*) reaching up to the time of the Prophet or 'Companions.' Already in the Prophet's lifetime the germs of dissent were latent, if not patent, amongst his followers, and on his death a serious dispute arose as to the choice and functions of his successor. Abú Bekr was finally elected caliph (Arab. *Khalífa*= vice-gerent, vicar, lieutenant), and was in turn succeeded by 'Umar, 'Uthmán, and 'Alí, these four being the 'orthodox caliphs' (*al-Khulafá ar-ráshidún*) of the Sunnites. 'Alí alone, the Prophet's cousin and son-in-law, was, however, regarded by a certain party as entitled to exercise the functions of supreme spiritual head of Islám. Those who held this view, according to which the first three caliphs were usurpers, were known as the *Shí'a*, or 'sect,' of 'Alí. The difference between the Sunnites and Shí'ites, therefore, appears at first sight to hinge merely on personal considerations; but if we look more closely into the matter, we shall see that this is not so, the former representing the democratic and the latter the monarchical view of government, as applied to the Church. According to the Sunnite view, the caliph was a mere defender of the faith, possessing no supernatural qualities or powers, and any adult and sane Muslim of upright life and sound doctrine was theoretically eligible for the office. To those who, like the Persians, were accustomed not merely to a monarchical government, but to a belief in the divine right of kings in the fullest sense—nay, who were wont to regard their royal family (notably in the Sásánian period, A.D. 226–650) as more or less divine beings, to whom alone appertained the right of ruling—this view could hardly commend itself, and it was natural that in their eyes the descendants of the Prophet alone should be entitled to the spiritual supremacy. Now the Prophet left no male issue, but his daughter Fáṭima married his cousin 'Alí, and to them were born al-Ḥasan and al-Ḥusayn, the second and third of the Shí'ite imáms. The latter, according to a tradition which, whether true or not, is ancient (it is regarded as historical by al-Ya'qúbí, who wrote about A.D. 892), married the daughter of Yezdigird III, the last Sásánian king. Their descendants, amongst whom are included all the remaining imáms, represent, therefore, not merely the Prophet's house, but also the old royal family of Persia, and this, as pointed out by Gobineau, is doubtless one of the chief reasons for the attachment of the Persians to the Shí'ite cause.

The Shí'ite imám, again, differs from the Sunnite caliph in that he possesses supernatural virtues and powers which entitle him, and him only, to pronounce authoritative decisions on spiritual matters. Moreover, his non-acceptance by the Muslim community in no wise impairs his right to the imámate, which depends solely on his nomination by his predecessor, or, in the case of the first imám, 'Alí, by the Prophet. The imám, therefore, is, as it were, an infallible, divinely appointed pope, while the caliph is a mere defender of the faith.

Agreeing in these general principles, the Shí'ites differ as to the number and sequence of their imáms. The two most important

sects were those 'of the Seven' (*sab'í*) and 'of the Twelve' (*ithna 'asharí*), so called from the number of the imáms whom they recognize. At the present day the latter are by far the more numerous, but the interesting and important Isma'ílí sect (including the Assassins of Persia and Syria) attained a high degree of power in the 10th, 11th, and 12th centuries of our era, when the Fátimid or Isma'ílí caliphs ruled in North Africa and Egypt, while the Carmathians continually menaced Arabia and Mesopotamia, and the Assassins terrorized Persia and Syria. The Isma'ílís still exist in Syria, and are represented by the Khojas of Bombay, the Mullás of Chitrál, and other kindred sects in India, Zanzibar, &c.

The Shí'ites may also be divided into moderate and extreme. The latter (called *Ghulát*) greatly exaggerate the powers of the imáms, whom they often regard as actual emanations of the deity, and frequently hold other doctrines foreign to Islám, such as incarnation, metempsychosis, and the like. The modern Persian sect of the Bábís, or followers of Mírzá 'Alí Muḥammad, the *Báb* or 'Gate' (put to death in 1850), were essentially, in their primitive form, a variety of these *Ghulát*, developed out of the Shaykhí sect founded by Shaykh Aḥmad Aḥsá'í (A. D. 1752–1826), but they have now to a great extent lost this character, and become more practical and ethical in their aims, and less speculative. The Nuṣayrís and Druzes of Syria and the 'Alí-iláhís of Persia also belong to the Ghulát.

The Shí'ites believe that the world can never be devoid of an imám, but that at most he is hidden from man's eyes, and will emerge as the Mahdí in the fullness of time to destroy injustice and misbelief, and restore the true faith. Hence the Shí'ite Mahdí is an essentially supernatural being, not, like the Sunnite Mahdí (e.g. the Mahdí of the Soudan), a mere divinely aided champion of Islám. The Sunnites, with their *sunnat*, or body of tradition, have sometimes been compared to the Roman Catholics, and the Shí'ites to the Protestants; but this comparison is quite misleading, since the Shí'ites have an equally large, if not larger, mass of traditions, while their theory of the infallibility of the imám (who is also regarded as 'immaculate,' *ma'ṣúm*) renders them, of the two sects, more comparable to the Romanists. The hostility between the Sunnites and the Shí'ites is generally (but to a less degree in India than elsewhere) deep and ineradicable, and has greatly conduced to the weakness of Islám.

Literature: besides the books mentioned under MOHAMMEDANISM, especially HAARBRÜCKER'S trans. of SHAHRISTÁNÍ, GOBINEAU, DOZY, and VON KREMER; WILHELM SPITTA, Zur Gesch. Abu'l-Ḥasan al-Ash'arí's (1876); GOLDZIHER, Beiträge zur Literaturgeschichte der Shí'a, Sitzber. Akad. Wiss. Wien (1874); and Muhammedanische Stud. (1889–90); QUERRY, Droit musulman (Shí'ite law, 1871–2); VAN VLOTEN, Recherches sur la Domination arabe, le Chiitisme et les Croyances messianiques sous le Khalifat des Omayades (1894); S. DE SACY, Exposé de la Religion des Druses (1828); S. GUYARD, Fragments relatifs à la Doctrine des Ismaélîs (1874), and Un grand Maître des Assassins au Temps de Saladin (1877); DE GOEJE, Sur les Carmathes du Bahraïn (1862); SALISBURY, On the Nuṣayrís, J. Amer. Oriental Soc., iii; DEFRÉMERY, Hist. des Ismaéliens ou Bathiniens de la Perse, plus connus sous le Nom d'Assassins, J. Asiatique, 1856; VON HAMMER, trans. by Hellert and de la Nourais, Hist. de l'Ordre des Assassins (1833); MIRZA KAZEM-BEG, Bab et les Babis, J. Asiatique, 1866; E. G. BROWNE, The Bábís of Persia, J. Roy. Asiatic Soc., 1889; A Traveller's Narrative written to illustrate the Episode of the Báb (2 vols., containing text, trans., appendices, and notes, including, at 173–211, a full bibliog. up to the date of publication, 1891); the New Hist. of Mírzá 'Alí Muḥammad the Báb (trans. from the Persian, 1893); Catalogue of Twenty-seven Bábí MSS. in the J. Roy. Asiatic Soc., 1892; Some Notes on the . . . Ḥurúfí Sect, ibid., 1898; and several important papers by Baron VICTOR ROSEN, of St. Petersburg, and Lieutenant (now Captain) TOUMANSKY, including the text and translation into Russian, with an excellent introduction and notes, of the Kitáb-i-Aqdas ('Most Holy Book') by the latter (1899). (E.G.B.)

Super-: Lat. prefix equivalent to Gr. HYPER- (q. v., 2).

Supererogation (works of, in theology) [Lat. *supererogare*, to pay out in addition]: Ger. *Supererogationswerke, überverdienstliche Werke*; Fr. *surérogation*; Ital. *supererogazione*. Good works done in a state of grace in excess of the strict requirements of the divine law, and constituting a store of merit which may be employed for the benefit of souls in purgatory or for other penitent persons.

The Roman Catholic doctrine of supererogation rests on a distinction between what is

mandatory and what is merely advisory in the divine law. With reference to the latter, man is free, and may lay up a store of merit which under given circumstances may be applied to the benefit of others. The doctrine involves a point of radical difference between the Romish and the Reformed Churches, the latter denying the validity of the distinction on which the doctrine of supererogation rests. (A.T.O.)

Superhuman [Lat. *super* + *humanus*, human]: Ger. *übermenschlich*; Fr. *surhumain*; Ital. *soprumano*. That which transcends human power or agency. Ordinarily applied to agency or power analogous to that of man and not to the forces or agents of nature.

Superhuman is to be distinguished from supernatural as belonging possibly to the realm of the natural. (A.T.O.)

Supernatural [Lat. *super* + *natura*, nature]: Ger. *übernatürlich*; Fr. *surnaturel*; Ital. *soprannaturale*. That which in its being or operation transcends the powers or operations of nature, the term nature including the spheres of finite spiritual as well as material forces. Cf. NATURE, and NATURALISM.

The distinction between natural and supernatural must not be confounded with that between natural and spiritual. The spiritual realm is not all supernatural, but includes a cross section of the natural. It is natural in so far as it falls under the operation of ordinary psychic laws. The supernatural is also spiritual. It is the realm of the infinite Spirit, and its operations, in so far as they manifest themselves in the world-series, are properly speaking miraculous.

Literature: see SUPERNATURALISM, NATURALISM (in theology), and MIRACLES. (A.T.O.)

Supernaturalism: Ger. *Supernaturalismus*; Fr. *surnaturalisme*; Ital. *trascendentalismo*. (1) The doctrine that the world, including man, is to be referred, in the last analysis, to a being who in his nature and power transcends the world and cannot be identified with its forces and operations.

(2) The doctrine that Christianity, and the miracles by which it is attested, are of supernatural origin, in the sense that they must be referred to God as their author and cannot be explained by means of natural agencies alone.

The drift of modern thought has been strongly in the direction of naturalism, not in the sense of denying the divine agency in the world, but rather in that of identifying that agency with the immanent processes of nature. This tendency shows itself, in the realm of Christian theology and history, in the attempt to bring all the facts of Christian doctrine and history under the categories of natural development.

Literature: BUSHNELL, Nature and the Supernatural; WM. MCCLINTOCK, Nat. Hist. of Religion; MARTINEAU, Seat of Authority in Religion; STÄUDLIN, Gesch. d. Rationalismus u. Supernaturalismus (1826); F. DE ROUGEMONT, Les deux cités, tome ii (1874); M. PERTY, Sichtbare u. unsichtbare Welt (1881); ANON., Supernatural Religion (1876); LIGHTFOOT, Supernatural Religion (1889). (A.T.O.)

Super-personal: see HYPER- (2).

Superstition [Lat. *superstitio*, from *superstare*, to stand in amazement and awe]: Ger. *Aberglaube*; Fr. *superstition*; Ital. *superstizione*. Subjectively: the disposition or tendency to ascribe phenomena which admit of natural explanation to occult or supernatural causes; objectively: any system of religious belief or practice which manifests such a tendency.

The English usage of the term is very loose. The German word Aberglaube seems to express its meaning more accurately. Superstition is excessive belief or credulity, and arises from the encroachment of faith on the rights of reason and knowledge. In popular usage the term is applied to any system of belief or worship that is conceived to be false or morally degrading, and especially to various forms of polytheism. (A.T.O.)

Supply and Demand (equation of): Ger. *Angebot und Nachfrage*; Fr. *offre et demande*; Ital. *offerta e domanda*. An economic process by which, through the agency of free competition, price movements result in most fully utilizing the available commodities in market.

(1) As the price of an article increases, the quantity demanded tends to diminish, and the quantity offered tends to increase. There will thus in ordinary cases be a certain price which 'clears the market' and makes the two equal.

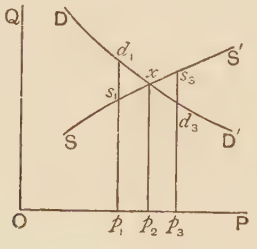
(2) This price will, theoretically, be reached by free competition. For, as long as the supply is in excess of the demand, sellers will be in danger of having unsold goods left on their hands, and will compete to force prices down; but if the demand is in excess of the supply, buyers will be in danger of having wants unsatisfied, and their competi-

tion will force prices up, thus producing an equation of supply and demand.

(3) The prices thus fixed tend to be proportionate to the expense of producing the several articles in the market. For if the market price of one article offers a higher rate of profit than the market price of another, investors will gradually abandon the production of the less profitable goods, and put their capital into the line which promises the higher rate, thus increasing the supply and diminishing the price at which it can be sold.

(4) The equation of supply and demand is thus a double process. First, a temporary adjustment of the demand to the supply by the commercial competition of merchants, which lowers (or in the converse case raises) the price until it corresponds to the MARGINAL UTILITY (q.v.); i.e. until it becomes just worth while for consumers to take the whole supply at the price in question. Then there is a more permanent though less accurate and universal adjustment of the supply to the demand, by the industrial competition of investors, which lowers, or raises, the price until it becomes proportionate to the marginal expense of production; i. e. until it becomes just worth while for producers to meet the whole demand at the price in question.

This is the theory of supply and demand as developed by the English political economists from Smith to Cairnes. Far greater precision was given by the adoption of the mathematical form of expression, which we owe, perhaps, most of all to Cournot (1838), Jevons (1871), and Marshall (1890). Cournot's curves, which are in some respects the best, have the form given in the cut. From an origin O lay off on an axis OP successive



prices Op_1, Op_2, Op_3; and from the extremity of these abscissae lay off ordinates, on any convenient scale, p_1d_1, p_3d_3, &c., to represent the quantities demanded at these successive prices. Similarly lay off on the same scale, ordinates p_1s_1, p_3s_3, &c., to represent the quantities supplied at these prices. The two series of points thus determined will give respectively curves of demand and of supply. The intersection x of these two curves will represent the equation of supply and demand; the price p_2x will be an equilibrium price, towards which, under the action of free competition, there will be a tendency to react in the face of temporary disturbances.

Literature: COURNOT, Recherches sur les Principes mathématiques de la Théorie des Richesses; MARSHALL, Princ. of Economics. For another form of the theory, developed by WALRAS and by CAIRNES, see RECIPROCAL DEMAND. (A.T.H.)

Supposition [Lat. *suppositio*, from *sub* + *ponere*, to place]: Ger. *Voraussetzung, Supposition*; Fr. *supposition*; Ital. *supposizione, presupposto*. (1) See HYPOTHESIS.

(2) One of the different regular ways in which a name may, in general, be used, so as to denote different objects.

The doctrine of *suppositio* is set forth in the *Summulae* of Petrus Hispanus and in most of the other similar mediaeval textbooks of logic. There are said to be five passions of terms. These are *supponibility, ampliability, restringibility, appellability*, and *distribuibility*. The definition of supposition is, 'Suppositio est acceptio termini substantivi pro aliquo.' The term is called the *supponent*, the object the *suppositum*. A supposition is either *common* or *discrete*; the former being that of a general substantive term, the latter that of a proper name, or of a common noun accompanied by a demonstrative pronoun, as *this man*. A common supposition is either *natural* or *accidental*. The natural supposition is the acception of a common term for all the objects 'pro quibus aptum natum est participari,' that is, for everything which it is adapted to signify; thus, in 'Man is mortal,' *man* stands for or denotes everything past, present, or future, which the word 'man' was invented to denote. An *accidental* supposition is where the application of a term is limited by its adjunct. Thus, if the verb is in a future or past tense, it will generally be only future or past individuals that are meant. Petrus Hispanus then goes on to divide accidental suppositions into *simple* and *personal*. Another way is to divide suppositions in general into *mixed* and *unmixed*. A supposition may be mixed in two ways. One way is when a compound term consists of words in apposition of which the acceptions are of different kinds, as where we say, 'The word *man* originally meant

a thinker.' Here the acception of 'word' and that of 'man' are of different kinds, the former denoting one of the objects which it was invented to denote, the latter not denoting anything but itself considered in its general employment. The other kind of mixed supposition is that of a term compounded of different nouns so that the denotation of the whole is determined by that of its parts; as where we speak of a *horse's shoe*. But if we say that a river makes a horse-shoe, the supposition is unmixed. Then unmixed supposition is either *material*, *simple*, or *personal*. *Material* supposition is that of a term taken as standing merely for all repetitions of itself, as *man* in the above example. Material supposition is either *discrete* or *common*; *discrete* when it refers to a particular instance of the occurrence of the term, when it is referred to as *this* or *that*; *common* when it does not refer to the special occurrence of the term merely. *Common material* supposition is either *determinate* or *confused*. Of the *determinate* a favourite example is '*Sortes* est dictio dissyllaba,' Sortes being the form which Socrates takes in logic. *Confused material* supposition is either *merely confused* (*confusa tantum*) or *confused* and *distributive*. Of the former an example is, 'Omne nomen est ly homo'; of the latter, 'Omne ly homo est nomen.' *Simple* supposition is that which occurs when we say 'homo est species' or 'homo convertitur cum visibili.' As Petrus says: 'Suppositio accidentalis simplex est acceptio termini communis pro re universali significata per ipsum terminum.' It was also held that the predicate term of an affirmative proposition has a simple supposition, because no *descensus* from it is admissible. Indeed wherever a term was undistributed it seems to have been held to have a simple supposition, except where the term was the subject of a particular proposition. *Personal* supposition is the acception of a general term for its particulars. It is either *determinate* or *confused*. *Determinate personal* supposition is that of the subject of a particular proposition. *Confused personal* supposition is either that of the subject of a universal proposition, which is confused *a necessitate signi*, or that of the predicate, which is confused *a necessitate rei*. The reason is that if 'Every man is an animal,' every man has his own animality; and it is these animalities for which the predicate supposes (*pro quibus supponit*). In that proposition, 'man' supposes *distributive et mobiliter*, because descent from it is valid; but 'animal' *immobiliter*, because descent from it is not valid. This brief summary gives but a slight idea of the intricacy, weakness, and confusion of the doctrine. (C.S.P.)

Supra. Lat. prefix signifying above or upon. As in 'supraliminal,' above the THRESHOLD (q. v.). (J.M.B.)

Supralapsarianism [Lat. *super* + *lapsus*, fall]: Ger. *Supralapsarianismus*; Fr. *supralapsarisme*; Ital. *sopralapsarianismo*. That doctrine of the order of the decrees which regards the decree of election as logically preceding those of the Creation and Fall, and as having its sole ground in the sovereign will and pleasure of God. See INFRALAPSARIANISM (also for literature). (A.T.O.)

Supraliminal: see SUPRA, and cf. THRESHOLD.

Supremacy (political): see SOVEREIGNTY.

Supreme Good: HIGHEST GOOD (q. v.); see also GOOD.

Surd: see PHONETICS.

Surdity [Lat. *surditas*, deafness]: Ger. *Taubheit*; Fr. *surdité*; Ital. *sordità*. Deafness. See DEAFNESS AND THE DEAF.

Surdi-mutism is a synonym for deaf-mutism, and surditas verbalis is a synonym for word-deafness. (J.J.)

Surface [Lat. *supra* + *facies*, face, through Fr.]: Ger. *Oberfläche*; Fr. *surface*; Ital. *superficie*. (1) Of an object: the outside.

(2) In mathematics: a spacial continuum of two dimensions. See SPACE. (J.M.B., H.B.F.)

Surplus Energy Theory: see PLAY, and cf. ART AND ART THEORIES.

Surplus Value [Lat. *super* + *plus*, more]: Ger. *Mehrwerth*; Fr. *plus-value*; Ital. *plus-valenza*, *plus-valore*. Excess of return above labour cost.

According to Marx, the chief exponent of this conception, a capitalist takes money, buys labour, and sells the products of that labour for more than he paid for the labour itself. The labour time spent is (according to Marx, who here follows Aristotle) the true measure of the value of the product. Any excess of price sold above price paid for labour represents a surplus value, created by the labour, but unjustly appropriated by the capitalist. Modern capital he regards as built up out of such appropriation of what really belongs to labour. See VALUE (economic). (A.T.H.)

Survival of the Fittest: see FITTEST (survival of), and EXISTENCE (struggle for).

Suso (or **Seuse**), **Heinrich.** (1295–1366.) Studied at Constance and at Cologne; became a Dominican, 1308. Greatly influenced

by Eckhart, he lived a life of religious seclusion, and of the severest ascetic habits, writing several works of mystical character.

Swallowing Reflex: Ger. *Schluckreflex*; Fr. *mouvement* (or *réflexe*) *de déglutition*; Ital. *deglutizione.* The complicated series of semivolitional and reflex movements performed in carrying moist, solid, or liquid substances through the mouth, pharynx, and oesophagus to the stomach.

Magendie has given the classical account of the organs of deglutition, together with the function of each in the act of swallowing (*Thèse sur les usages du voile du palais*, 1808). He divides the act into three stages: (1) passage of the bolus through the isthmus of the fauces: performed by movements of the tongue, which may be voluntary but are usually reflex, the position of the bolus acting as stimulus; (2) passage of bolus through the pharynx: a pure reflex, consisting on the motor side of rapid and nicely co-ordinated contractions of the pharyngeal muscles, by which the bolus is shot across the air-passages and into the oesophagus; (3) passage of bolus through the oesophagus. The act is completed in about six seconds, of which the peristaltic contraction of the oesophagus takes 4·8 seconds. Kronecker and Meltzer (Du Bois-Reymond's *Arch. f. Physiol.*, 1883, Suppl. 3, 328) studied the act of deglutition by modern methods, and found that the bolus is put under great pressure in the pharynx and literally shot down to the cardiac opening of the stomach, sometimes even forcing open the cardiac sphincter and entering the stomach by initial impetus, the passage through the pharynx and to the cardiac opening taking about 0·1 second. The pressure is largely produced by the simultaneous contraction of the myelo-hyoid and hyoglossus muscles, which pull the larynx upward and forward underneath the bolus and at the same time draw the tongue backward against it. (C.F.H.)

Swedenborg, Emanuel (and **Swedenborgianism**). (1688–1772.) He was born at Stockholm, the son of the Lutheran bishop, Jesper Swedberg. He was well educated, graduating as Ph.D. at Upsala University. He published in 1709 a little treatise made up of extracts from Seneca and Publius Syrus Mimus with his comments, but turned immediately to a scientific life in the lines of mathematics and mechanics, and so successfully that, under the ennobled name of Swedenborg, he became a member of the Commission of Mines and of the House of Nobles. He spent a year in England to gain a knowledge of 'the progress made in the last one or two centuries.' He was in touch there with astronomers, but was interested in the useful rather than in the theoretical.

Seventy-seven works, of which twenty were in Swedish, the rest in Latin, are classed as scientific by his bibliographers. He introduced the calculus into Sweden. He invented the air-tight stove. He began the science of crystallography. He reasoned out before Franklin the identity of lightning and electricity. He anticipated Laplace in the discovery that planets and planetary motion are derived from the sun. He discovered the animation of the brain. The law of the conservation of energy seems to have been anticipated in his doctrine of action and reaction equal and necessary to life. Among these works the following are of a philosophical and psychological character: *Comparison of Wolff's Ontology and Cosmology with the Author's Principia*; *On the Brain*; *Economy of the Soul's Kingdom*; *Rational Psychology*; and *Kingdom of the Soul considered anatomically and philosophically.*

In the *Principia*, a work in folio with large plates, he fully set forth the nebular theory in 1734. Kant's pamphlet, *Theorie des Himmels*, appeared in 1755, Laplace's *Exposition du Système du Monde* in 1796. Kant's indebtedness to Swedenborg, whom he ridiculed in his *Geisterseher* after having read him extensively and written of him with high praise, has been a subject of investigation by impartial investigators such as Joseph Le Conte, E. S. Holden, and Magnus Nyren. For a summary of the *Principia* the following may suffice.

Part I treats of the origin and laws of motion, their existence being traced from a first natural point down to the formation of a solar vortex, and then to the constitution of the elements and of the three kingdoms of nature. Motive effort tends to a spiral figure. Part II applies the theory of vortical motion to magnetism in order to test the truth of the principles and to explain magnetic phenomena thereby. Part III applies the principles to cosmogony, the origin of the planets from the sun, and their revolutions until they arrived at their present orbits; also to the elements, the motions of which are held to be vortical; also to the laws of the three kingdoms of nature. 'Nature is always alike and cannot be different in largest from what she is in smallest.'

In the works *De Regno Animali* he analysed the statements of anatomists, avoiding his own observations lest they should be made to favour his views, and dealing with the organs in an ascending series and as the servants of the mind. This brought him to a perception of the constant interaction of the mental and the material or of the spiritual and the natural in man, of which he treated in a small work called *The Hieroglyphic Key of natural and spiritual Arcana*, written in 1741.

In this progress, aloof from theology and pursued uninterrupted by self-seeking, he had reached the point where he must stop or enter the field of the soul's relation to God. He took up the study of the Hebrew Bible, producing in the last thirty years of his life a series of works of about the same number as in the previous stage. These works dealt with the interpretation of Scripture by means of the relation of earthly objects to spiritual realities, the spiritual world as substantial and directly known to him, and the teachings so derived as forming a purified Christianity which will realize the era of the New Jerusalem.

The philosophy of these works is especially set forth in those on *The Love and Wisdom of God*, and on *The Divine Providence*. The former is in five parts, treating of love as the life of man and of God as Love itself. His Wisdom is as the *existere* of his Love, the *esse*. He is Infinite Man. These two qualities in him are distinctly one and are as substance and form. Love by Wisdom creates eternally. Man, like all other creations, is a recipient of life, thus finited, and represents in himself all creation. The Infinite is in time and space, but not of them. The first of creation is the sun of heaven, which animates the spiritual world and fills all degrees of life, which are not continuous but discrete, so that the connection of a higher with a lower degree is that of cause and effect or of correspondence. Matter is the ultimate of creation. Man is born in the lowest degree with power to develop the higher degrees, and this development or regeneration is the history of the race repeated in the individual. It is the first chapter of Genesis repeated in its spiritual meaning. The mind is composed of will and intellect, corresponding to the Divine Love and Wisdom. Evil is man's perversion of love received. Man is preserved free. There is no Divine reprobation. Every one who is in order fulfils his destiny, his own use here and hereafter.

Death severs the correspondence of the spiritual part of man with the material, and he is thenceforth in his spiritual body a denizen of the spiritual world. Angels are the risen souls who conform to the Divine order; evil spirits are those who oppose that order through self-love, and who therefore live in less freedom. Evil is permitted, but always from a good purpose, and this permission is a part of Providence, which has no other end than the formation of heaven. Though continually led of this Providence man must act as of himself. In the other life, freed from the trammels of space and time, man enjoys the highest form of life of which he is capable, in the best companionship and in the most congenial service of all others. Sex is of the mind in the unequal combination of will and intellect in man and woman, so that an unselfish union of two minds forms the true unit of humanity in both the natural and spiritual worlds. Procreation is only of the natural world. Life hereafter is in an environment which perfectly corresponds with the spirit. All the angels form a grand unit, a *maximus homo*.

The religion of this system is similar. There is one Divine Being. Men first dwelt with him in childlike ignorance and innocence, the Eden of the Bible, the golden age of tradition. As man developed in intelligence he very gradually became wayward, and the loss of his innocence led at length to an evil condition called the Flood. Idolatry with gross rites followed, and man was near losing his humanity. Then the same Fatherliness which had hitherto watched over him took on a nature like his own by virgin maternity, and withstood the rising evil tide, and redeemed man by subduing with love all self-love in that nature. In the order of man's regeneration the Son of Man was glorified, and in him 'dwells the fullness of the Godhead bodily.' In the Divine as in man there is the Trinity, not of persons in a crude sense, but of Love the Father or substance, Wisdom the Son or form, and Creative Life the Holy Spirit or useful activity.

The sacred Scripture is divinely inspired in possessing within its homely exterior a spiritual or prophetic sense fulfilled in the Redeemer (the 'Word made flesh') and in the regenerated soul. The deeper meaning is therefore the creative order or truth in the universe embodied in words, as a soul is in its body. A symbol cannot mean two things, but denotes that which it has as its cause of being, as the face denotes the mind.

Charity, or the law of life, is conformity to order. One's special service is true charity; faith alone is of no avail. Man on account of his past must be turned from controlling self-love and thus born anew. The two sacraments of Baptism and the Eucharist are perfect correspondences, and therefore highly useful as embodying the new life entered upon and continued.

The materialistic misunderstandings of the middle ages, when primitive Christianity was corrupted by priestcraft and strife, supposed a second personal Advent and a physical end of the world. A truer understanding perceives rather the end of that perverted or Babylonian state of things, and a renewal of Christianity by a revelation of the true meaning of the Divine word by means of a well-prepared mind.

Swedenborg regarded himself as having been led all the way towards the accomplishment of this unique service, and in the performance of it he was placid and modest. He published books at his own expense. He put no name on them until near the last. He lived unmarried and frugally. To secure liberty of the press he made several journeys to Amsterdam and London, dying in the latter place. He never attempted to organize his sympathizers. He was still writing on longitude in 1766 after most of his theological works had been published. He said of himself that he had been led over this pathway from 1710 because 'it was necessary that spiritual things should now be understood rationally; therefore I was first introduced into the natural sciences and thus prepared; the dogma that the understanding is to be held under obedience to faith had closed the Church, and what can open it except an understanding enlightened by the Lord?' He also declared that he had received nothing from any one but the Lord through study of the Scriptures.

Literature: of the biographies of Swedenborg that of Benjamin Worcester (1883) is the best. His works have been issued in the original Latin, in English, and many other languages. The principal books not mentioned above are Heavenly Arcana, Apocalypse Revealed, Heaven and Hell, Doctrines of the New Jerusalem, Intercourse of Soul and Body, Marriage Love, and True Christian Religion. (T.F.W.)

Swoon [ME. *swowen*]: Ger. *Ohnmacht*; Fr. *évanouissement, syncope*; Ital. *svenimento*. A faint; loss of consciousness. See Syncope. (J.J.)

Syllogism [Gr. *συλλογισμός*]: Ger. *Syllogismus, Schluss*; Fr. *syllogisme*; Ital. *sillogismo*. (1) Syllogism consists in stating in one proposition the truth involved in two non-relative propositions after the elimination of a common term, as

All a is b;
(*s*) All c is a;
$\therefore$ All c is b.

The first of these propositions (which contains the predicate of the conclusion) is called the major premise; the second, which contains the subject of the conclusion, the minor premise. (C.L.F.)

(2) According to Aristotle and the great body of logicians, a simple syllogism has two premises and a conclusion, and three terms, one of which, the 'middle,' disappears from the conclusion. In the writer's opinion, the limitation to non-relative premises is contrary to usage and to propriety. (C.S.P.)

(3) The sense laid down by Aristotle at the opening of his *Analytics*, 24 b 18, and repeated with verbal accuracy at the beginning of the *Topics* and at the beginning of the *Sophistici Elenchi*, and less formally in the logical part of the *Rhetoric* (A ii. § 9), namely, Συλλογισμός ἐστι λόγος ἐν ᾧ τεθέντων τινῶν ἕτερόν τι τῶν κειμένων ἐξ ἀνάγκης συμβαίνει τῷ ταῦτα εἶναι, 'A *syllogism* is a symbol (λόγος) in which, some things having been posited, something different from the assumptions necessarily joins itself to them, by being involved in the being of the facts assumed.'

It will be seen that, in this definition (2), no particular stress is placed upon the premises being two in number; although Aristotle is afterwards emphatic in insisting that every syllogism has two premises. The following inference is, on this definition, syllogistic: '*A* stands to a lover of *B* in the relation of benefitting everybody loved by him; hence *A* benefits *B*.' The two essential characters are that the inference shall be necessary, and that the fact inferred shall be involved in the very being of the facts premised, regardless of the manner in which those premised facts may have become known. The operation called *colligation* by Whewell, which consists in bringing the different premises together and applying them, the one to another, or to a repetition of itself, in a particular way, wherein lies all that calls for sagacity in deductive reasoning, is then no part of the syllogism. Aristotle seems to say (1 *Anal. Pr.* xxxii) that some necessary inferences are not syllogisms; but the passage is not clear. However, if

colligation is to be excluded from syllogism, then also such an inference as the following will be non-syllogistic: 'Every man is an animal; hence whatever is in a given relation (as for example, 'other than') to every man is in that relation to every animal.'

An argument consisting of a single syllogism is a monosyllogism, one of more than one a polysyllogism, called also *monosyllogistic* and *polysyllogistic proof*.

Trendelenburg, in his *Elementa Logices Aristoteleae*, gives an account of the origin of the word, remarking that συλλογίζεσθαι is properly to conjoin in arithmetical computation or in reasoning. Thus, in the *Philebus*, 41 C, where Jowett translates 'you may infer,' the word means to put together two conclusions already reached and then deduce a further result. In the *Theaetetus*, 186 D, where it is said that ἐπιστήμη does not consist ἐν τοῖς παθήμασι, but ἐν τῷ περὶ ἐκείνων συλλογισμῷ, συλλογισμός is a synonym for what in the *Phaedrus*, 249 B, is called simply λογισμός, "ἐκ πολλῶν ἰὸν αἰσθήσεων εἰς ἓν λογισμῷ ξυναιρούμενον." And Trendelenburg is of opinion that there are in Aristotle traces of the broader meaning, as when he speaks of ὁ ἐξ ἐπαγωγῆς συλλογισμός. Others, however, think that Aristotle's language shows that he drew a distinction between ἐπαγωγή and the syllogism from ἐπαγωγή, the latter being valid only in case of a complete enumeration. Bonitz, however, gives other instances of Aristotle's using the word in a broad sense. The chief of these is in *Rhetoric*, A xi. § 23, where Cope's note quoting a similar passage in the *Poetics* is interesting. Lutoslawski points out that one of Plato's very earliest dialogues, the *Charmides*, 161 A[1], contains a regular syllogism in *Cesare* introduced by the word συλλογισάμενος (160 E). He also remarks that in the *Philebus*, the term μέσον is used in the same technical sense as in Aristotle, and adds: 'If we take into consideration that it would be entirely against Plato's view of literary composition to enumerate all possible figures of syllogism in a dialogue, as is done in Aristotle's treatise, it becomes quite possible and even probable that Aristotle's theory of syllogism was more than prepared by Plato.' Of course this can be no more than a surmise, but it is a reasonable one, since Plato's mathematical mind would naturally have looked at reasoning in a formal light. At any rate it is almost incredible that any man should have struck out all that is in Aristotle's *Analytics* if the ground had not been prepared. Moreover, Aristotle everywhere exhibits a mind quite unmathematical, so that one cannot but suspect that he received some hints towards a general outline of syllogistic from some source. Yet we cannot, for an instant, doubt Aristotle's veracity in the last chapter of the *Sophistici Elenchi*, where he says of syllogistic: 'Of this subject, on the other hand, there has not been a part cultivated and a part neglected, but nothing whatsoever of it has hitherto existed. . . . About syllogizing I am aware of absolutely nothing having been previously said [περὶ δὲ τοῦ συλλογίζεσθαι παντελῶς οὐδὲν εἴχομεν πρότερον ἄλλο λέγειν][1].' (C.S.P.)

[The two sections following are written from the points of view of the two definitions respectively, and reflect current differences of view.—J.M.B.]

(1) Deductive reasoning in general is stating explicitly (in a conclusion) something which has already been implicitly stated either in a single proposition, or in several propositions put together (called the premise, or the premises), thus—

(*m*) If every point of the line x is equidistant from A and B, and if every point of the line y is equidistant from B and C, it follows that what are points at once of x and of y are equidistant from A, B, and C.

Drawing a conclusion from a single premise is called 'immediate inference'; the conclusion may be equivalent with the premise (that is, it may furnish sufficient ground for recovering the premise)—in this case a mere transformation of the original premise has been per-

[1] Written, as there is strong unpublished ground for thinking, 394 B.C., while Aristotle only went to Athens 368 or 367 B.C. (Grote thinks not till 362 B.C.) All the other dialogues here mentioned are subsequent to Aristotle's joining the school.

[1] It has been argued that Aristotle may here, as it is said he often does, employ the first person plural to mean the students of Plato; and also that πρότερον ἄλλο would not exclude aid from contemporaries. The present writer, without making any particular pretension to philological learning, apprehends that it is quite clear that Aristotle is speaking of himself personally, and that he means to say that no doctrine of the syllogism, in which he now takes the first steps (ὡς ἐκ τοιούτων ἐξ ἀρχῆς ὑπαρχόντων ἔχειν ἡ μέθοδος), had existed before his *Analytics* and *Topics*. Such hints as he may have received from Plato cannot (the writer believes) have been in Aristotle's memory when he penned those words. But a man does not always know how he originally came by ideas which occupied him at first little, but afterwards more and more, up to almost complete absorption for many long years.

formed; or it may state less than the premise, in which case it may be called an UNDER-STATEMENT (q.v.). If the conclusion is drawn from more than one premise the reasoning is called 'mediate.'

In the example given above, all the terms about which information is given in the premises reappear in the conclusion; but in the most useful form of mediate reasoning, there is involved the dropping of information, and usually of information concerning a term involved in each of the two premises; this may be referred to as the elimination of a middle term. Thus in

A is in the same box with X;
(r) B is in the same box with X;
$\therefore$ A and B are in the same box with each other,

the conclusion is irrespective of the middle term X. If what is desired is information about the relation of A and B to each other, then dropping all information concerning X is the removal of what was burdensome—is a loss which is a gain. Eliminative reasoning may be defined to be the throwing away of information (partly contained in each of two premises) concerning uninteresting terms and saying what remains in one proposition. (If the information which is dropped was contained in one of the premises only, it is simply a case of under-statement.) So we come to the definition (1) of the syllogism: if the relation between the terms involved in an instance of eliminative reasoning is the simple copulative connection expressed in *is* or *implies* (in any of their forms—*a is b, Some a is not b, That a is b implies that c is d.* See PROPOSITION) the reasoning is called 'syllogism.'

The syllogism is frequently defined as a group of three judgments, of which the last is necessitated by the two preceding, but that does not exclude such an argument as (m), which few persons would consider a syllogism. It is also defined (Lotze) as the union of two judgments to produce a valid third judgment (not consisting in the simple summation of the other two); and by this definition the argument (r) is not excluded. More successfully, the syllogism has been defined in general terms to consist in the applying of a general rule to a special case. The general rule, or law, is the major premise, the special case is the minor premise, and the application is the conclusion:

(t) Rule,
Case,
Application.

(The word application, like conclusion and judgment, is unfortunately ambiguous; we should say the applying, the concluding, the judging, for the act, and leave the other words for the product of the act. The term RESULT (q.v.) has also been used.) This definition, of course applies, like the *dictum de omni*, only to the first figure.

It has been argued by many logicians that all reasoning is syllogistic, and by many others that not all reasoning is syllogistic. The solution to the difficulty is this: both contentions are legitimate, but the different parties to the discussion take a different view as to what *constitutes the reasoning* in a given argument. Thus the argument (r) can be put in the form: If two things are in the same box with a third thing, they are in the same box with each other; but A and B are in the same box with X, and hence, &c., and this, it is said, is surely syllogism. The question, now, is this: Did the *reasoning* in (r), as first given, *consist in* the referring, implicitly, to *some* authorizing principle, or is it characterized *by the nature* of the authorizing principle referred to? On performing an ordinary syllogism, we have in mind the *dictum de omni* as our legitimizing principle, and in *referring to it* (instinctively) we are again going through an instance of rule-case-application. Now *which* constitutes this syllogism—the *referring*, or the *principle referred to?* It seems most natural to say the latter, and to conclude, therefore, that the argument (r) is not a syllogism, but an argument corresponding to it, for which the legitimizing principle is a *dictum* concerning the copulative relation 'is in the same box with,' and corresponding in form, in this case, with the *dictum* of Aristotle. There are countless relations of this sort which are transitive (or, as it might better be called, eliminative), and of which the 'principle' is perfectly self-evident to us. There are others, of course, which offer no ground for the elimination of a common term; as, A is longer than X and B is longer than X. Bradley is severe upon that large body of logicians who maintain that all mediate deductive reasoning is syllogistic. [It would seem to be a matter of definition, of the use of a term; there seems to be a large majority in the 'large body,' and the psychology of reasoning appears to lend support to their view.—J.M.B., C.S.P.]

It has been sometimes said that the validity of the syllogism can be made to depend upon the laws of thought, but the assertion that the

syllogistic axiom can be derived from anything else whatever is a contradiction in terms—it can be proved that the syllogism cannot be proved. For proof consists in referring a special case to a general rule, under which it is shown to fall, and that very act has its justification only in the principle of the syllogism. What principles shall be assumed as the fundamental axioms of any branch of knowledge is, to a certain extent, a matter of convenience—frequently, of two, each will entail the other, and it is sufficient to assume either one. But this does not apply to the syllogism; whatever else may be regarded or not regarded as an indispensable assumption, the axiom of the syllogism must always be assumed the first thing of all, for without it nothing can be derived from anything. Various forms of expression in words have been given to this axiom, as the *dictum de omni*—Whatever can be affirmed of the whole can be affirmed of what has been shown to be a part of the whole (as usually given, this applies only to immediate inference, not to the syllogism); or, in terms of pure intention, the *nota notae*—A mark of a mark is a mark of the thing itself. For the syllogism in the second and third figures (with the middle term as predicate, or as subject, of both premises) other principles are needed (Lambert), or those figures can by processes of REDUCTION (q.v.) be brought to the first figure. Wundt gives, as covering mediate inference in general (*r*), what he calls 'the principle of relation,' which amounts to this—Things which stand in a relation to a third thing stand in a relation to each other. But this is simply incorrect; if *A* and *B* are each *X*, they need not stand in any direct relation whatever to each other; if *A* is longer than *X* and *B* is longer than *X*, nothing whatever can be affirmed about the relation of *A* to *B*. Relations are too various to permit of any general statement being made about them—some are mediating and some are not.

There is still another view of the principle of the syllogism, which has been held by various writers. It is that it is sufficiently contained in the definition of the proposition—that in saying *Whatever is a is b*, it has already been said that anything that can be shown to be *a* is *b*. Thus the doctrine of the syllogism, under the aspect of rules applied to cases, becomes a tautology; it is simply—A general rule can be applied to any special case that can be shown to fall under it. Mill's objection to the syllogism would here amount to saying that there can be no fresh application of a general rule to special cases; for until *after* you have tested it in all its special cases, you are wrong to believe that the rule is really general.

From the time of Sextus Empiricus, it has been maintained by different writers that the syllogism is of little value, that is, leads to no advance in thought, because the conclusion is already contained in the premises. It is true in a sense that there is no gain in material knowledge in the syllogism, but the gain through convenience of manipulation is great. Thus if the axioms, postulates, and definitions of geometry, accurately and fully stated, were handed over to a master of symbolic logic, he could deduce from them, with infallible certainty, the latest proposition of Euclid without stopping to state any of the intermediate propositions; but ordinary reasoners find it vastly more convenient to proceed from step to step, and in fact ordinary human powers, unaided by a mechanical device, do not suffice for any different procedure. What the formal reasoner as such actually does is to sit at his desk, and taking into his consciousness statements of fact brought to him from South Africa and China, from the metaphysical assumptions of the speculative philosopher and from the laboratory work of the experimental psychologist, to piece them together, so far as they have anything in common, and to get out of them things not known *before* they fell together. His intellectual *work* consists (1) in the search for middle terms, and (2) in the reduction of the propositions containing them to forms in which he is capable of seeing what relations implicitly contained in them he can make explicit, and (3) in stating those conclusions in single sentences. For example, the syllogism

(*v*) No priests are martyrs;
All but priests are saints;
∴ All martyrs are saints,

cannot be seen intuitionally by every one to be either valid or invalid. (To get the real force of the syllogistic formula, it is much better to practise on propositions which are not true.)

Another objection that has been brought against the syllogism is that the conclusion is *not* contained in the premises, that until the conclusion has been separately tested, it is not safe to say that the major premise is universally true. Bain has very justly said that the contribution made to logic by Mill in connec-

tion with this question is revolutionary; it is, however, properly speaking, a contribution to the theory of knowledge rather than to the theory of the syllogism in itself. His thesis is not so much that 'real reasoning is from particulars to particulars,' as it is that 'all knowledge is in the last resort empirical.' Aristotle himself, according to H. Maier (*Die Syllogistik des Aristoteles*, 1900), was not ready to admit the validity of the syllogistic form as such, in those cases in which the premises are insecure. Our vast structure of knowledge is composed of elements of various degrees of certainty. One piece or another, from time to time, suffers shipwreck; but many pieces have had their validity so thoroughly tested that *relatively* they are inexpugnable. The objection is perfectly well founded in instances where the general rule is got as a direct abstraction from the special cases, and also in the cases where, for any other reason, our grounds for believing it are relatively uncertain; but under all such circumstances we are perfectly aware of what is the real value of the syllogism—that it is in such cases this very function (the testing of the major premise) for the sake of which we perform it. The progress of science consists in great part in guessing at general rules, or in accepting them temporarily as furnished us by more or less uncertain inductions, in applying them to special cases, and then in returning to nature to see if the result of the application holds good. If it does, the rule is in so far confirmed; if it does not, the rule must be revised—for the moment it has become a humble particular, which we hope to elevate again into the rank of a universal by finding some appropriate determinant of the subject, or alternation to the predicate, to connect with it. Thus if $a \prec b$ is found to have exceptions, our next step is to discover the x or the y which will give us $ax \prec b$ or $a \prec b+y$. If, on the other hand, there is a general rule in which we have confidence, and observation has just furnished us with a special case, if the application of rule to case gives a result out of harmony with well-known facts, it is the accuracy of our observation of the special case that we proceed to improve upon. There are always some propositions which are so vastly superior to others in respect of certainty that, unless we are to renounce the task of living altogether, we must feel ourselves authorized to take them as safe premises.

The Modern Treatment of the Syllogism. Modern logic, which begins with De Morgan and Boole, has for one of its principal characteristics the unrestricted admission of negative terms; the older logicians were chary of introducing them as predicates even. They regarded such a proposition as *Some a is not b* as belonging to a separate category from the universal and the particular proposition, and gave it a distinctive name—the 'infinitive or limitative proposition.' But this is unnecessary; it is perfectly safe to treat negative terms like any other terms. And it is only this aversion to dealing with negatives that has caused the logicians to consider that

$$\begin{array}{ll} & \text{No } a \text{ is } b; \\ (n) & \text{No } c \text{ is } \bar{b}; \\ & \therefore \text{ No } a \text{ is } c, \end{array}$$

is not a syllogism at all. The infelicity of this has been pointed out, among others, by Bradley. It is not a syllogism in the restricted traditional sense of the word, but it is an argument so exactly like it that the difference is entirely inessential; it is merely necessary to let 'common term' include 'common term though of different quality,' for the common definition of syllogism to cover cases like this. The ordinary rules for the validity of syllogistic reasoning are applicable only if the propositions are stated in some one of the four traditional forms. When the eight propositions of the Complete Scheme are taken account of, the restrictions as to negatives being done away with (see PROPOSITION), the number of fruitful pairs of premises is vastly increased. The argument, e. g.,

$$\begin{array}{ll} & \text{Everything is either } a \text{ or } c; \\ (p) & \text{Everything is either } b \text{ or } \bar{c}; \\ & \therefore \text{ Everything is either } a \text{ or } b, \end{array}$$

would seem strange to the strict Aristotelian, but with the enlarged meaning of common term it falls strictly within the definition of syllogism. And as frequently happens in such a case, the whole is found to be, as regards difficulty, much less than the part; rules for validity, as will appear immediately, are far more simple than with the ordinary propositional scheme.

Two premises and a conclusion taken together constitute a syllogism; the three following propositions taken together—

'None who are discontented are happy,'
'But some reformers are happy
and no reformers are contented,'

form an argument,—not, it is true, an argument in which there is a sequence, but an argument in which there is a rebuttal. (It is, without doubt, the form in which, in primitive

times, argument first arose; propositions are accepted 'unthinkingly' until after they have been uttered, and have aroused—the regular effect of listening to speech—the instinct of rejection on the part of the hearer.) In this argument the implication contained in the word *but* is that the statements made cannot be all three true together; if the last two are true, the first is not so; if the first and either of the others are true, the remaining one is not true. In other words, the three propositions taken together constitute an inconsistency, or an incompatibility, or, as it may perhaps be called, to distinguish it from the syllogism, an antilogism. Expressed in letters for terms, it affirms that no a is b, no c is non-b, *and* some a is c cannot be all three true at once; if any two of them are known to be true (it matters not which two) the remaining one is known to be false—that is as much as to say that its contradictory is known to be true, and to be, therefore, the conclusion of a valid syllogism of which the other two are the premises.

If we write for the moment $(ab)_0$ for *No a is b* and (ac) for *Some a is c* (u is chosen as standing for a part of the universe), we may put this:—

$$(ab)_0\ (c\bar{b})_0\ (ac)_u \leqslant 0,$$

which is read *That no a is b, no c is non-b, and some a is c is impossible.* The simple test for the validity of this form of argument is this: (1) *There are three propositions, two universal and one particular, each two with one term in common.* (2) *The term common to two like propositions must appear with unlike signs; the term common to two unlike propositions must appear with like signs.* The *dictum* involved is simply the principle of Excluded Middle: ac is not b (for no a is b), and it is not non-b (for no c is non-b), and hence it cannot exist at all.

The simple device, therefore, for testing the validity of any of the thousands of syllogisms such as (v) and (ρ), which may present themselves to the actual reasoner, in addition to the ordinary syllogisms of the logics ($16 \times 16 \times 16 \times 2$, or 8,192 in all), is to turn every universal proposition into the form *No a is b*, every particular into the form *Some a is b*, to deny the conclusion, and then to apply the rule just given. The source of the simplicity of this rule is that symmetrical copulas are used throughout, and that therefore it no longer makes any difference whether a term stands in the subject or in the predicate.

A consideration of these more general forms covers, in simple terms to start with, all the so-called hypothetical and alternative syllogisms, and many more, of course, than are usually treated in the textbooks. The existential syllogism is represented, in terms, by

All a is b;
a is existent;
$\therefore$ b is existent,

which is the exact parallel to

Always, if a is b, c is d;
That a *is* b occurs (here and now);
$\therefore$ That c *is* d occurs (here and now).

These last two forms differ from the ordinary syllogism merely in the fact that one of the Special Terms of logic (q. v.) occurs as a predicate. They may be named *existential syllogisms.* Modal propositions are most simply treated by making the modal word a predicate, instead of attaching it to the copula—that is, by transforming *a is possibly b* to *That a is b is possible.* We have merely to remember, then, that the negative of *necessary* is *possibly not*, and that the negative of *possible* is *necessarily not.* (C.L.F.)

(2) The syllogistic inference may be analysed into several distinct steps, each of which shall consist either in inserting or in omitting something. It does not evidently follow that such a method must afford a simpler representation of necessary inference than to take the inference of the *modus ponens* as elementary. But in point of fact it does so. The passage from premise to conclusion may be regarded as a permissible transformation, and best, of a transformation of the nature of an insertion; that is to say, the conclusion is superadded to the premises; since the premises remain true.

Aristotle's verb *συμβαίνει* in the definition of the syllogism takes this view. The relation between the protasis and apodosis of a hypothetical proposition differs formally from the relation between a premise and conclusion in no essential respect, except that the protasis is not positively asserted. To regard the fact C as necessarily following from the facts A is to hold that whenever facts analogous to A are true, a conclusion related to them as C is to A will always be true. In the proposition, 'If A is true, C is true,' we may have regard only to the actual state of things; in any case the proposition is equivalent to 'Either A is not true, or C is true.' But more usually we refer to a range of possibilities, and mean that whenever any fact analogous to A is true, that which is related to it as C is to A is true. The same relation subsists between the subject and

predicate of a universal proposition: to say that 'All men are mortal' is to say that, taking any object X whatsoever, if X is a man, X is mortal. This agrees with the definition of universal predication given by Aristotle, and commonly known as the *dictum de omni*. It will be remarked that this definition does not make a universal proposition to assert the existence of its subject.

Now, since in any possible system of logical representation illative transformation must be performed and be recognized as permissible, it follows that any representation of a universal proposition which treats any other relation than that of the conclusion (with the premises) to the premises alone as the principal relation expressed by the proposition, leaves the logical analysis incomplete.

Three figures (see FIGURE, syllogistic) of syllogism were recognized by Aristotle, in the first of which the middle is subject of one premise (the *major* premise) and predicate of the other (the *minor* premise); in the second the middle is the predicate of both premises; while in the third the middle is subject of both premises. Aristotle recognizes but four moods (see MOOD, in logic) of syllogism in the first figure. Some early Peripatetic, Theophrastus it is said, added five indirect moods: *Baralipton, Celantes, Dabitis, Fapesmo, Frisesomorum*. It is rumoured that Galen first constituted a fourth figure by transposing the premises of these. About the 16th century this figure began to be commonly admitted, and is now almost universally so. With this, the five moods have somewhat unnecessarily changed their names. Those now most usual are *Bramantip, Camenes, Dimaris, Fesapo, Fresison*.

The logic of RELATIVES (q.v.; see also SYMBOLIC LOGIC) throws great light on syllogism. It shows that the copulated premises are, as expressed in Peirce's algebra of dual relatives, in one of the three forms,

$$(x \dagger \bar{y})\,(\breve{y} \dagger z) \quad (x \dagger \bar{y})\,\breve{y}\,z \quad (x\,\bar{y})\,\breve{y}\,z$$

These give respectively

$$x \dagger z \qquad x\,z \qquad x \top z$$

The last is a so-called spurious conclusion, but such syllogisms are unscientifically excluded from consideration in almost all treatises. There remain, therefore, but two kinds of syllogism, the *universal* and the *particular*. Beginning with *Barbara*, it can be mathematically proved that every possible necessary inference from two premises, both having the same form as the conclusion, must depend upon a relation of *inclusion* (see Schröder, *Alg. u. Log. d. Relative*, 337 ff., where the 'solution' given of transitiveness is the most accurate possible definition of *inclusion*, in that general sense in which a thing need not necessarily include itself). Thus,

The S's are included among the M's;
The M's are included among the P's;
$\therefore$ The S's are included among the P's.

So, for example, the pseudo-syllogism $S < M$, $M < P$, $\therefore S < P$, depends partly on the fact that $S < P$ implies that the units required to measure S are included among those required to measure P, and partly on the fact that $S < P$ implies that the units required to measure P are not included among those required to measure S. Putting, therefore, s, p, and m for the units required to measure S, P, and M, we have, on the one hand,

The s's are included among the m's;
The m's are included among the p's;
$\therefore$ The s's are included among the p's;

and, on the other hand,

The s's are included among the m's;
The p's are not included among the m's;
$\therefore$ The p's are not included among the s's.

If, in order to study the differences between the different moods of syllogism, we suppose that in the universal proposition S and P are modified by relatives, these must be the same for both, in order that *Barbara* should be valid. Calling this common relative h, the form of the universal affirmative, A, can only be one of the two following:

Any h of an s is an h of a p;
Any h of every s is an h of every p.

These differ merely as being the converse of one another. For putting k for non-h, the latter is equivalent to

Any k of a p is a k of an s.

We may, therefore, assume the first of the two forms as the form of A. Then the validity of *Celarent* requires only that the universal negative E shall have for its subject, 'Any h of an s' or 'Something not an h of an s.' The validity of *Darii* requires only that the predicate of the particular affirmative, I, shall be 'is an h of a p.' The validity of *Ferio* requires that the subject of the particular negative, O, should agree with that of I (in a sense not easy to explain without special notation), while its predicate should be the same as that of E, and further, that if either I or E expresses existence, so should O. The validity of *Baroko* and the moods of the second figure, generally, requires that the predicate of O (and of E) should be 'is not an h of a p.' The validity of *Bokardo* requires that the subject of O (and

of I) should be either 'Some h of an s' or else 'Anything but an h of an s.' The result is that there are three systems of propositions which give all the traditional moods, except *Darapti*, *Felapton*, *Baralipton*, and *Fapesmo*, which are invalid if universal propositions are understood to be the exact denials of particular propositions. These three systems are:—

First System.

A. Any h of an S is an h of a P;
E. Any h of an S is not an h of a P;
I. Some h of an S is an h of a P;
O. Some h of an S is not an h of a P.

Second System.

A. Any h of an S is an h of a P;
E. Something not an h of an S is not an h of a P;
I. Whatever is not an h of an S is an h of a P;
O. Some h of an S is not an h of a P.

Third System.

A. Any h of an S is an h of a P;
E. Any h of an S is not an h of a P;
I. Whatever is not an h of an S is an h of a P;
O. Whatever is not an h of an S is not an h of a P.

The O of the third system might have been taken as A, and the same forms would have been reproduced in the same way with changed h. In the ordinary syllogistic the first system is used, and h is 'identical with.' With a limited universe of marks, h will be a 'character of.'

It will be observed that *Celarent* and *Darii* introduce each an additional principle in slight modification of *Barbara*, and *Ferio* reunites those principles. The *second* and *third* figures introduce marked additional principles, which the so-called fourth figure, i.e. the Theophrastean syllogism, reunites. In the second figure there is a perceptible difference between the mode of inference of *Camestres* and *Baroko* on the one hand, *Cesare* and *Festino* on the other; although in *reasoning* itself it is morally impossible to distinguish *Camestres* from *Cesare*. Parallel remarks apply to the third figure. Of the Theophrastean moods, *Frisesomorum* alone is peculiar, *Celantes* and *Dabitis* depending merely on the principles of the second and third figures respectively.

The fact that the second and third figures involve peculiar principles is shown by the fact that the modes of reduction of any mood of each involve some peculiar immediate inference.

Thus, the reduction of the second figure involves the conversion of E. Now this conversion can be stated in syllogistic form; but it will be a syllogism in *Cesare*, which is the typical mood of the second figure, thus:—

No M is N;
Any N is N;
$\therefore$ No N is M.

So the third figure involves the conversion of I, and when this is put into syllogistic form, the syllogism is in *Datisi*, the typical mood of the third figure, thus:—

Any N is N;
Some N is M;
$\therefore$ Some M is N.

It may be said that the convertibility of I depends upon the equiparance of the relation which I expresses. But even in that case, it must be noted that there is a certain difference between the *individual* and *definite* convertibility commonly understood by equiparance and the *indefinite* conversion, properly understood, of I, which is alone required in ordinary syllogistic. This will appear below.

The second and third figures can be reduced to the first apagogically, but the principles of the reduction are different. That of the second figure is that if the *negative* (not the denial) of the result of a hypothetical assumption under a known rule is found to be true, then the negative of the subsumption is true. Thus, referring to the usual syllogism, 'All men are mortal; all patriarchs are men; hence, all patriarchs are mortal'; if the rule is correct, get all patriarchs are immortal, it follows that all patriarchs are non-men. The statement of this principle is simply a form of the conversion of E. So the third figure may be apagogically reduced by the principle that if, a subsumption under a hypothetical rule being admitted, a partial result is found true, the partial truth of the rule follows. Thus, admitting that all patriarchs are men, if it be found that some patriarchs are mortal, it follows that at least some men are mortal. The second figure can always be reduced to the first by the simple conversion of the major premise, this being first made negative, if necessary, by infinitation. Thus,

Any M is P = Any M is not not-P;
$\left.\begin{matrix}\text{Any}\\ \text{Some}\end{matrix}\right\}$ S is not P;
$\therefore$ $\left.\begin{matrix}\text{Any}\\ \text{Some}\end{matrix}\right\}$ S is not M,

is reduced by the conversion of the major to

'No not-P is M.' So the third figure is reduced to the first by the simple conversion of the minor premise. But there is here a difficulty, owing to our not having in our ordinary languages a term to express the reversal of the quantity of a proposition; that is to say, a single operation which shall change Any to Some, and Some to Any.

The difference between a particular and a universal proposition is that, in the former, the selection of the individual of which the predicate is asserted is transferred from the hearer to a person competent and friendly to the proposition. Let this transfer be repeated, and the choice goes back to the first party. Using 'some' in the sense of prescribing such transfer, 'Some-some-S is P' = Any S is P. In that way *Disamis* and *Bokardo* are reduced as follows. The moods are:

Some S { is / is not } P;
Any S is M = Some-some-S is M;
$\therefore$ Some M { is / is not } P.

Converting 'Some-some-S is M' to 'Some M is Some-S,' we have the syllogism of the first figure—

Any Some-S { is / is not } P;
Some M is Some-S;
$\therefore$ Some M { is / is not } P.

Any syllogism of the second or third figure can also be reduced by transposing the premises, and converting the two propositions not converted in the method just described. But still the same kind of conversion continues to be required in the case of each figure, thus showing that the conversions of E and I are logically allied to the second and third figures respectively. *Camestres* and *Disamis* are the easiest so to reduce; *Festino* and *Ferison* the most difficult.

Festino.

Some S is P = No Some-S is not-P;
No M is P = Any M is not-P;
$\therefore$ Some S is not M = No Some-S is M.

The conversion of E gives from the first premise 'No not-P is Some-S.' This with the second premise gives 'No M is Some-S.' Thence another conversion of E gives 'No Some-S is M,' which is the conclusion.

Ferison.

Some S is M = Any Some-S is M;
No S is P = Some-some-S is not-P;
$\therefore$ Some M is not P = Some M is not-P.

The conversion of I gives from the second premise 'Some not-P is Some-S.' This with the first premise gives 'Some not-P is M,' which by another conversion of I gives 'Some M is not-P,' the conclusion.

The conversion of E depends on the fact that otherness is an equiparance. If everybody loves everybody who loves him, it follows that if every man loves every woman, then every woman loves every man; and on the corresponding principle, if every S is other than every P, then every P is other than every S. The conversion of I, on the other hand, is justified by the fact that the propositional quantities of breadth and depth are inseparable. 'Some S is P' = There is an embodiment of S conforming to the idea of P.

Now observe that we do not necessarily infer that that *same* P is S, but only that there is somewhere a P that is S. All that is needed for this inference is that whenever there is an embodiment of an idea conforming to a second idea, there is also an embodiment of the latter idea conforming to the idea first embodied. It is the principle that there cannot be a cork that fits a bottle unless there be a bottle that is fitted by a cork.

When we pass to probability the figures of syllogism become of an idea highly important. Thus, take the following reasoning, the nature of which we shall presently examine:

The probability of throwing doublets with a pair of dice is $\frac{1}{6}$;
Different throws of pairs of dice are independent;
$\therefore$ The probability of throwing precisely two doublets in six throws is just half that of throwing precisely one doublet in six throws.

In order to analyse this reasoning, it is necessary to note what the premises and conclusion mean. The precise meaning of the first premise is that we should square our actions on each single occasion to the fact that, taking throws of the dice as they occur in the course of experience, the ratio of the number of throws of doublets hitherto to the total number of throws hitherto would, if the course of experience were endless, become, after a time, permanently remote from every other ratio than 1 : 6, but would never become so from this ratio. The meaning of the second premise is that this is so not only for all the throws, but also for every endless portion of that totality of throws whose selection is determined by the ordinal relation of the throws composing it to previous throws of any given

kind; so that, where such principle of selection allows, the throws are taken as they occur in the course of experience in endless succession.

The necessary conclusion is that we should square our action on any occasion to the principle that taking an endless succession and entirely different sets of six throws, just as they occur in the course of experience, the ratio of the number of sets containing two doublets to the number of sets containing one doublet will at length permanently depart from every other ratio than 1 : 2, but will not so depart from this ratio.

This inference is necessary; yet it is merely probable in this sense, that we cannot be sure that the number of sets of six throws containing just one doublet would be twice the number containing two doublets in a hundred trials, or in a million, or in any other fixed number. But what is certain is that any other ratio would eventually prove decidedly wrong, while 1 : 2 would not. This is a probable syllogism of the first figure, since it recognizes a case as coming under a general rule, the result of which it accepts as valid in that case. Of course the reader will not fail to observe that the sense in which the reasoning is said to be a syllogism is strictly defined. It is not meant that the above is a simple syllogism.

But if it were not known exactly how often with a given set of dice doublets would be thrown, since they may be similarly or dissimilarly loaded, and if we simply threw the dice and counted the whole number of throws and the number of throws of doublets, and if, finding that in twelve hundred throws there were about two hundred doublets, we were thence to conclude that in the long run about one-sixth of the throws would be doublets, this would be reasoning in the third figure. This would be in no sense necessary, except that if the experimentation were continued endlessly, it must approximate to the true ratio at last. This form of reasoning differs from the probable syllogism of the first figure, in that there the precise value of the long-run ratio was stated in advance; while here the concluded ratio is subject to modification as experience is amplified.

It is inference in the third figure, since if the rule were that any ratio far from one-sixth would be satisfactory in the long run, the same ratio would probably be tolerably satisfactory in twelve hundred throws. Now, no ratio far from one-sixth is satisfactory for this set of twelve hundred throws. Hence, the rule is probably false. Now, the inference that a general rule is false because the result to which it would lead in a special case is not true is syllogism of the third figure. Although this mode of inference is not necessary, it is necessary that the method should ultimately yield an approximately correct conclusion.

A probable syllogism which appears, in consequence of a want of sharp insistence upon what is really the subject and what the predicate of propositions, to be in the second figure may be essentially of the same nature as a probable syllogism in the third figure; but it seems to be impossible that it should really be so, since there can be no strict objective probabilities of the kind required. If, for instance, we knew that in a considerable series of sets of six throws, one doublet precisely had occurred in a set twice as often as two doublets precisely, and we were thence to conclude that the two dice were probably normal, because, although other constitutions of dice might produce the same result, yet they are very unusual constitutions, we have here a probability of quite another kind; and instead of its being certain, as in the third figure, that the method of inference would in the long run lead to an indefinite approximation to the truth, it is here quite possible that the concluded constitution of the dice will always be entirely different from the true one. The three figures are therefore quite distinct; and we see that probability lends an importance to the three figures which modern logicians have not been willing to accord to them.

Aristotle pays no attention to hypothetical syllogisms; but it is said that Theophrastus studied them. We find them treated in considerable detail by Boethius. During the middle ages, purely formal syllogistic made no progress worth mention. About the middle of the 19th century some steps were taken. Sir W. Hamilton proposed a syllogistic system of no merit (see *An Essay on the new Analytic of Logical Forms*, by T. S. Baynes, Edinburgh, 1850) based on the following system of propositional forms, called the system of the thoroughgoing quantification of the predicate.

All *A* is all *B*, meaning that the whole collection of *A*'s is identical with the whole collection of *B*'s.

All *A* is some *B*, meaning that the whole collection of *A*'s is identical with part of the collection of *B*'s.

Some A is all B, meaning that a part of the collection of A's is identical with the whole collection of B's.

Some A is some B, meaning that a part of the collection of A's is identical with a part of the collection of B's.

Any A is not any B, meaning that the whole collection of A's is excluded from the whole collection of B's.

Some A is not any B, meaning that a part of the collection of A's is excluded from the whole collection of B's.

Any A is not some B, meaning that the whole collection of A's is excluded from a part of the collection of B's.

Some A is not some B, meaning that a part of the collection of A's is excluded from a part of the collection of B's.

There is also a pretence at a second series of meanings in depth, never clearly explained. Such a system is glaringly faulty; but it had some vogue in its day. There were also some other somewhat similar systems by Archbishop Thomson, Spalding, &c.

De Morgan constructed various systems of syllogistic of much greater merit, although, after all, they only complicate the subject to no purpose. His principal system, in which he postulates that no term is without breadth or is coextensive with the universe, is based on the following propositional forms:

$X))Y$. All X's are some Y's, i. e. Any X is a Y.

$X)\cdot(Y$. All X's are not (all) Y's, i. e. Any X is non-Y.

$X(\cdot)Y$. Everything is either some X or some Y (or both), i. e. Any non-X is Y.

$X((Y$. Some X's are all Y's, i. e. Any non-X is non-Y.

$X(\cdot(Y$. Some X's are not (all) Y's, i. e. Some X is non-Y.

$X()Y$. Some X's are some Y's, i. e. Some X is Y.

$X)(Y$. Some things are not either (all) X's or (all) Y's, i. e. Some non-X is non-Y.

$X)\cdot)Y$. All X's are not some Y, i. e. Some non-X is non-Y.

These forms arose, as one might guess, from the application of *not* to the subjects of the old four; so that it might be called the system of the thoroughgoing qualification of the subject. Whether or not this qualification of the subject can be said to be involved in the structure of any syllogism is the question upon the decision of which that of the acceptance of De Morgan's system must depend.

Under these conditions (figure of course disappearing) De Morgan gets eight universal syllogisms,

$$))))\ (\cdot)))\ (((\cdot)\ ((((\ (\cdot))\cdot(\ )))\cdot(\ )\cdot(((\ )\cdot((\cdot);$$

eight *major-particular* syllogisms,

$$(((\ )\cdot((\ )))\cdot)\ )))(\ )\cdot((\cdot(\ (((\cdot(\ (\cdot))(\ (\cdot))\cdot);$$

and eight *minor-particular* syllogisms

$$(()))\ )\cdot)))\ )((\cdot)\ )(((\ )\cdot))\cdot(\ ())\cdot(\ (\cdot(((\ (\cdot((\cdot).$$

De Morgan also takes account of complex premises. Moreover, he developed the syllogistic of relative terms, and especially the highly important *syllogism of transposed quantity*; and he, Boole, and others studied numerically definite syllogisms.

The following technical phrases may be defined:

Arithmetical syllogism. Blundevile, in his *Arte of Logicke* (1599), in illustration of his position that 'God hath prescribed certaine bounds of necessitie . . . which bounds are Syllogismes rightly made,' instances this question: 'If one pound of waxe be worth a groat, what is tenne pound of waxe worth? Marry tenne groates, which is prooved by a Syllogisme in this manner: Every pound of waxe is worth a groat; but here is ten pound of waxe: *Ergo*, they are worth ten groats: and like as in these kinds of Sillogismes Arithmeticall, the proportion which is to bee judged by mans naturall knowledge, doth shew the Consequent to bee infallible, even so the Consequents in other Syllogismes are shewed to be infallible, by such demonstrations as are not farre fetched, or doubtfull, but are manifest, plaine and evident.'

Categorical syllogism: a syllogism composed of categorical propositions.

Common syllogism: a syllogism whose middle is a general term.

Composite syllogism: a syllogism having more than two premises.

Compound syllogism: a hypothetical syllogism, that is, a syllogism containing a disjunctive (or conditional) or copulative premise.

Conditional syllogism: a syllogism containing a conditional premise, especially the *Modus Ponens* and *Modus Tollens*, although some logicians refuse to these arguments the name of syllogism.

Conjunctive syllogism: according to Hamilton (*Lect. on Logic*, Appendix VIII), a *conditional syllogism* (above).

Contentious syllogism: a fallacy, whose author seeks only victory in argument.

Copulative syllogism: a syllogism with a copulative conclusion.

Decurtate syllogism: a syllogism with one of the premises unexpressed (*Cent. Dict.*).

Defective syllogism: a syllogism in the statement of which one of the premises is omitted.

Demonstrative syllogism: a syllogism which generates science.

Dialectic syllogism: a syllogism which generates opinion, being made of probable and credible propositions. The phrase is as old as Aristotle; but the use to which syllogism is put does not alter its nature. It is the argumentation or reasoning, not the logical form, which is dialectical.

Didascalic syllogism: same as *Demonstrative syllogism* (above).

Dilemmatic syllogism: a syllogism having for its minor premise a dilemmatic proposition (*Cent. Dict.*). See DILEMMA.

Direct syllogism (συλλογισμὸς δεικτικός): a syllogism proceeding from a *rule*, and the subsumption of a *case* under that rule, to the *result* of the rule in that case. One of the four moods, *Barbara*, *Celarent*, *Darii*, *Ferio*.

Disjunctive syllogism: a syllogism whose cogency depends upon the relation between the members of a disjunctive premise.

Expository syllogism: a syllogism whose middle is an individual term.

Figured syllogism: a syllogism so stated that it is in a definite figure.

Hypothetical syllogism: a syllogism either conditional (or disjunctive) or copulative. Often used for a syllogism conditional but not disjunctive, although there is no material difference between a conditional and a disjunctive proposition. A copulative proposition is the precise denial of a conditional or disjunctive proposition; and every conditional or disjunctive syllogism will by apagogical transformation give a copulative syllogism. But many logicians refuse to consider copulative syllogisms to be syllogisms on the ground that the conclusion contains nothing not stated in the premises taken together; just as the same logicians exclude other arguments from the class of syllogisms because their conclusions contain matter not contained in the premises taken together.

Imperfect syllogism: a syllogism of which one premise remains unstated.

Indirect syllogism: a syllogism which needs to be proved to be valid by reduction to direct syllogism.

Modal syllogism: a syllogism containing modal propositions.

Perfect syllogism: a syllogism of which no part of the leading principle can be stated as a premise and so eliminated from the leading principle; since if this is attempted it is still needed as leading principle.

Proper syllogism: the Ramist name for an *Expository syllogism*.

Proportional syllogism: a species of relative syllogism depending on proportions. The following is a stock example:

> Ut se habent duo ad quattuor, ita se habent tria ad sex:
> Sed duo se habent ad quattuor, ut dimidium ad totum:
> Ergo, tria se habent ad sex, ut dimidium ad totum.

Pure syllogism: a syllogism composed of propositions *de inesse*.

Relative syllogism: a syllogism involving relative terms. Such syllogisms have been recognized as proper subjects of logic by all logicians beginning with Aristotle.

Simple syllogism: a syllogism not capable of dissection into two or more syllogisms. But the indirect syllogisms which have always been recognized as composed of direct syllogisms and immediate inferences are always classed as simple syllogisms, and that, although Aristotle and others prove those immediate inferences syllogistically.

Singular syllogism: see *Expository syllogism*.

Sophistic syllogism: a syllogism intended to deceive, or which it is pretended is intended to deceive. See SOPHISM.

Tentative syllogism (συλλογισμὸς πειραστικός): seems to be much the same as a *Dialectic syllogism* (above).

Valid syllogism: a syllogism whose premises assert facts whose being is partly composed of the being of the fact asserted in the conclusion.

Syllogism of transposed quantity: a syllogism in which the whole quantity of one concluding term, or its contrary, is applied in a premise to the other concluding term, or its contrary, by means of a relation of one-to-N correspondence. As in the following: Some X's are not Y's; *for* every X there is a Y which is Z; hence, some Z's are not X's. (C.S.P.)

Syllogistic (argumentation; also used as a noun). SYLLOGISM (q. v.).

Symbol [Gr. *σύμβολον*, a conventional sign, from *σύν* + *βάλλειν*, to throw]: Ger. *Symbol*; Fr. *symbole*; Ital. *simbolo*. (1) A SIGN (q. v.) which is constituted a sign merely or mainly by the fact that it is used and understood as such, whether the habit is natural or conventional, and without regard to the motives which originally governed its selection.

Σύμβολον is used in this sense by Aristotle several times in the *Peri hermeneias*, in the *Sophistici Elenchi*, and elsewhere.

(2) An algebraic character. (C.S.P.)

Symbol (and **Symbolic**) [Gr. *σύν* + *βάλλειν*, to put together, compare]: Ger. (*symbolisch*); Fr. (*symbolique*); Ital. (*simbolica*). (1) An object which stands for some other object or idea; the former is said to be 'symbolic' of the latter. Cf. SIGN, and SIGN-MAKING FUNCTION.

(2) In aesthetics, an object which, apart from its own immediate and proper significance, suggests also another, especially a more ideal content which it cannot perfectly embody.

The symbol may be either natural: as light is a symbol of truth; or traditional and conventional: as the cross is a symbol of sacrifice.

The conception of art as symbolic goes back at least to Plotinus, but the term seems to have come into general aesthetic currency through Goethe and Schlegel—the latter declaring it to be (in sense 1, above) the essence of all art. Hegel made the symbolic in sense (2) the principle of oriental as compared with Greek art. Vischer laid special stress on the symbolic (significant) character of art, as against the Formalists. Recently, the psychology of symbolization has received special treatment. Fechner explained it as association. Others have considered it as an investiture of the object with the observer's own idea and feeling in a more intimate manner than is implied by the term association, and have sought for terms expressing this, as 'mitfühlen,' feeling with (Lotze), 'einfühlen,' feeling into (R. Vischer, Fr. Vischer), a lending or animating (Leihen, Beseelung; Fr. Vischer), fusion (Verschmelzung; Volkelt). According to Lotze we live over again in the object the motion to produce it, &c. Groos (*Play of Man*, Eng. trans., 31) makes eye-movements and other 'inner imitations' 'symbolic' of the real movements of imitation. See SYMPATHY (aesthetic).

Literature (to 2): HEGEL, Aesthetik, ii. Th., i. Abth.; STERN, Einfühlung u. Association in d. neu. Aesth. (1898); FECHNER, Vorschule d. Aesth., ii; LOTZE, Gesch. d. Aesth., 74 ff.; FR. VISCHER, Aesthetik; Krit. Gänge, v, vi; and Das Symbol, Altes u. Neues (1889); R. VISCHER, Über d. optische Formgefühl (1873); VOLKELT, Der Symbolbegriff in d. neuesten Aesth. (1876); LIPPS, Raumästhetik u. geometrisch-optische Täuschungen (1897); VOLKELT, Zeitsch. f. Philos., cxiii. 161–79; STERN, ibid., cxv. 193–203; KÜLPE, Zeitsch. f. wiss. Philos., xxiii. 145–83; TURNARKIN, Arch. f. Gesch. d. Philos., xii. 257–89; FERRERO, I simboli (1892). Cf. also FORM, BALANCE, SYMMETRY. (J.H.T.)

Symbolic Function: no foreign equivalents in use. The function whereby a mental result primarily referring to one set of objects is transferred to another set of objects; the first set is said to be symbolic of the second.

SYMBOL (q. v.) is frequently used in a very wide sense as equivalent to any kind of sign. But it seems desirable to limit its application in psychology to cases in which the sign is provisionally substituted for the thing symbolized. Words are not substitute signs in this sense; they are means by which we attend to what is signified, not themselves objects of attention. Cf. SIGN-MAKING FUNCTION, and SIGN (for a more special meaning of symbol). (G.F.S.)

Symbolic Logic or **Algebra of Logic**: Ger. *Algebra der Logik*; Fr. *logique symbolique ou algorithmique, algèbre de la logique*; Ital. *logica simbolica*. Symbolic logic is that form of logic in which the combinations and relations of terms and of propositions are represented by symbols, in such a way that the rules of a calculus may be substituted for actively conscious reasoning.

An algebra of logic enables us to disengage from any subject-matter the formal element which gives its necessary (apodictic) force to reasoning; it is therefore nothing but an exact logic, that is to say, the complete realization of the purpose of formal logic (cf. PROPOSITION). The ordinary formal logic has, from the earliest times, substituted symbols (viz. the letters of the alphabet) for significant terms, and has thus added much to the facility with which the validity of arguments can be tested; symbolic logic goes a step further, and adds symbols to stand for combinations of terms, or functions of terms, and statements of relations between terms. The aid which is thus given to logic, not only in the carrying out of complicated trains of

reasoning, but also in the exact analysis of the various steps involved, is very great.

Several systems of symbolic logic have been proposed within the last half-century (see literature). We shall here describe only one —that of Boole, as reformed and developed by Schröder, Peirce, and others. This system is not based exclusively upon the consideration of the extension (application) of terms and of propositions, but covers all relations of intension (SIGNIFICATION, q. v.) as well. It is, however, more convenient, when formulae are to be expressed in words, to use the language of one or the other of these two parallel interpretations exclusively; that of the application-interpretation will be used in what follows.

Throughout symbolic logic there is an exact analogy between terms and propositions, so that the same theorems (or formulae) apply to both; it is not a case of two parallel systems (a calculus of concepts and a calculus of propositions), but of a single system susceptible of a double interpretation. In what follows, the letters of the alphabet stand for either concepts or propositions[1].

The algebra of logic rests upon two *relations* —that of inclusion (or subsumption, or sufficient condition) and that of equality, of which the first only is fundamental—and upon three operations—aggregation (or logical addition), composition (or logical multiplication, as it has been unfortunately named, upon a false analogy), and negation. Of the three operations, negation together with either of the other two would suffice for the algebra (though facility of expression is greatly increased by admitting all three of them); hence one relation (or form of statement) and one operation, together with negation (applied not only to terms but also to the assumed form of statement and to the assumed operation), are all that are absolutely essential to the building up of the theory.

The relation of inclusion, which is written $a \leqslant b$, signifies that the class a constitutes a part (or it may be the whole) of the class b, or that the quality-complex a is indicative of the quality-complex b, or that the statement a involves the statement b. Conceptual Interpretation: The a's are all b's; Propositional Interpretation: If a is true b is true, or, a entails b. The relation of equality, or identity, which is written $a = b$, signifies, for one thing, that the two classes a and b are identical (made up out of the same elements). It may be defined as equivalent to the system of two inverse inclusions

$$(a \leqslant b)(b \leqslant a);$$

C. I.: All a is b and all b is a; P. I.: a entails b and b entails a. In the case of propositions, logical equality is called *equivalence*. Multiplication and addition are thus defined in terms of classes: the sum of two classes is the class which contains all the elements of each (without repetition); the product is the class which contains all the elements which are common to both. Formally these operations may be defined as follows:

$$(a \leqslant c)(b \leqslant c) = (a+b \leqslant c);$$

C. I.: If a is c and b is c, what is either a or b is c, and conversely; P. I.: If a implies c and b implies c, whatever implies either a or b implies c, and conversely.

$$(c \leqslant a)(c \leqslant b) = (c \leqslant ab);$$

C. I.: If c is a and c is b, c is a and b, and conversely; P. I.: If c implies a and c implies b, c implies both a and b, and conversely. It will be seen that the signs $+$ and $\times$ (understood in the form ab) correspond to a certain extent to the conjunctions *or* and *and*, but not completely; for instance, $a+b \leqslant c$ must be read '*a and b* are *c*,' but by throwing the first member of this inclusion into a subordinate predicate (which can always be done without change of meaning) it may be read 'What is *a or b* is *c*.' The inclusion $ab \leqslant c$ can be read '*a* which is *b* is *c*,' or '*b* which is *a* is *c*,' or 'What is *a* and *b* is *c*.'

It is necessary to define at once two special terms which play an important rôle in symbolic logic, the logical *zero* (0) and thelogical *everything* (∞ or 1). They are defined formally as follows:

$$0 \leqslant x, \quad x \leqslant 1,$$

where x stands for any term whatever, or for any proposition whatever. In the conceptual interpretation, 1 is *everything* which *exists*, or the universe of discourse, and 0 is *nothing*, or *the non-existent*; in the propositional interpretation, 1 is the aggregate of those states of things which *occur*, or are *true*, and 0 is the *false*, or the *non-occurrent*. The special terms may equally well be defined as follows:

$$x + 0 \leqslant x, \quad x \leqslant x \times 1;$$

we should then say that 0 is that term which, when added to any term, makes it no greater than it was before, and that 1 is that term which, when compounded with any term, makes it no less than it was before. From either of these pairs of definitions the other

[1] Abbreviations: C. I. = conceptual interpretation; I. = propositional interpretation.

pair follows at once; the following formulae are also evident:

$$0 \leqslant 0, \quad 0 \leqslant 1, \quad 1 \leqslant 1,$$
$$(x \leqslant 0) = (x = 0), \quad (1 \leqslant x) = (1 = x),$$
$$x + 0 = x, \quad x \times 1 = x.$$

The third operation of exact logic is negation. It is indicated by a horizontal line placed above the term or the expression to be denied; $\bar{a}$ signifies non-a; $a \overline{\leqslant} b$ is the denial of All a is b. (In this last case the sign of negation may be equally well placed upon the copula; $a \leqslant \overline{b}$ means Not all a is b.) Negation may be defined formally by the two following statements: $a\bar{a} \leqslant 0$, $1 \leqslant a + \bar{a}$, which translate respectively the principles of 'contradiction' (or mutual exclusion) and of 'excluded middle' (or conjoint exhaustion—see Laws of Thought). C.I.: a which is non-a is non-existent, Everything is a or non-a; P.I.: The statements a and non-a cannot both be true at once, What is possible is that a is true or that non-a is true (i.e. that a is false). It can be proved that the negative as thus defined is unequivocal, i.e. that the term non-a is unique.

The propositions of logic may all be deduced from the definitions and a limited number of principles, or axioms, which are independent and irreducible; among them are the principle of identity: $a \leqslant a$ (C.I.: All a is a; P.I.: If a is true a is true), which has for a corollary $a = a$; and the principle of the syllogism:

$$(a \leqslant b)(b \leqslant c) \leqslant (a \leqslant c)$$

(C.I.: If a is b and if b is c, then a is c; P.I.: If a implies b and b implies c, then a implies c). The operations of multiplication and addition are subject to the commutative law,

$$a + b = b + a, \quad ab = ba,$$

the associative law,

$$(a + b) + c = a + (b + c), \quad (ab)c = a(bc),$$

and to the special law of tautology,

$$a + a = a, \quad aa = a.$$

The law of absorption,

$$a + ab = a, \quad a(a + b) = a,$$

can be proved, but the law of distribution,

$$a(b + c) = ab + ac, \quad a + bc = (a + b)(a + c),$$

it is not possible to demonstrate without the assumption of an additional principle, or axiom, namely $a(b + c) \leqslant ab + ac$.

The distributive law has for corollaries the following formulae:

$$ab + cd = (a + c)(b + c)(a + d)(b + d),$$
$$(a + b)(c + d) = ac + bc + ad + bd.$$

These formulae, as well as all those already given, show that there is a perfect correlation, or duality, between addition and multiplication, which consists in the fact that the signs + and × may be interchanged upon the condition of interchanging at the same time the special terms 0 and 1, and inverting the sign of inclusion, $\leqslant$.

The following formulae may also be demonstrated:

$$(a \leqslant b)(c \leqslant d) \leqslant (ac \leqslant bd) \leqslant (a + c \leqslant b + d)$$
$$(a = b)(c = d) \leqslant (ac = bd) \leqslant (a + c = b + d);$$

these enable us to combine (but not without loss) several inclusions or equalities by either adding or multiplying them member by member (as in algebra). It is also possible to add a common term to each member of an inclusion or an equation (but not to take one away) and to introduce a common term as a factor (but not to remove one).

The operation of negation adds important properties to the algebra, of which the principals are: *the law of double negation*, $\bar{\bar{a}} = a$ (C.I.: Non-non-a is identical with a; P.I.: To deny the denial of a statement is the same as to affirm it); the *formulae of De Morgan*,

$$\overline{ab} = \bar{a} + \bar{b}, \quad \overline{a + b} = \bar{a}\bar{b},$$

which enable us to distribute the process of denying upon the elements of a sum or of a product (and which illustrates the duality mentioned above), and the principle of contraposition,

$$(a \leqslant b) = (\bar{b} \leqslant \bar{a}),$$
$$(a \overline{\leqslant} b) = (\bar{b} \overline{\leqslant} \bar{a})$$

(C.I.: 'All a is b' is the same thing as 'All non-b is non-a'; 'Not all a is b' is the same thing as 'Not all non-b is non-a'; P.I.: 'If a is true b is true' has the same validity as 'If b is false a is false'; that 'The truth of a does not entail the truth of b' is equivalent to saying that 'The falsity of b does not entail the falsity of a'). As a corollary to this we may add

$$(a = b) = (\bar{a} = \bar{b}).$$

The principle of contraposition is merely a special case of the principle of Transposition (q.v.), that is, of

$$(ac \leqslant b + d) = (a\bar{d} \leqslant b + \bar{c}),$$
$$(ac \overline{\leqslant} b + d) = (a\bar{d} \overline{\leqslant} b + \bar{c}),$$

which may be stated thus: an element of a sum in a predicate is the same thing as its negative as a factor of the subject, both in the universal and in the particular statement in terms of this copula. (But the opposite relation does not hold—an element of a sum cannot be introduced in this way into a subject nor a factor into a predicate.)

The formulae for the addition and the multiplication of 0 and 1,

$$0+x=x, \quad 1+x=1,$$
$$0\times x=0, \quad 1\times x=x,$$

lead to the *formulae of development*, which were given by Boole,

$$x=x(a+\bar{a})(b+\bar{b})\ldots$$
$$=xab\ldots+x\bar{a}b\ldots+x\bar{a}\bar{b}\ldots,$$
$$x=x+a\bar{a}+b\bar{b}+\ldots$$
$$=(x+a+b)(x+a+\bar{b})(x+\bar{a}+b)\ldots,$$
$$0=(a+b)(a+\bar{b})(\bar{a}+b)(\bar{a}+\bar{b}),$$
$$1=ab+a\bar{b}+\bar{a}b+\bar{a}\bar{b}$$
$$=abc+ab\bar{c}+a\bar{b}c+\ldots,$$

and so for any number of simple terms, a, b, c, ... (The terms of the development of 1 are called its *constituents*.)

To Boole is due also the formula for the development of a function in terms of any variable, or unknown quantity, x, which it contains: $F(x)=F(1)x+F(0)\bar{x}$, $F(1)$ being what $F(x)$ becomes for $x=1$, and $F(0)$ being what $F(x)$ becomes for $x=0$. Hence one of the normal forms for a logical statement (in one unknown quantity) is

$$ax+b\bar{x}\leqslant 0,$$

which may equally well be written (since $0\leqslant F(x)$ is always true, no matter what $F(x)$ may be),

$$ax+b\bar{x}=0,$$

or,

$$\bar{a}x+\bar{b}\bar{x}=1.$$

In order to reduce the problems of logic to inclusions or equations of this form, it is necessary to apply to the premises (into which the verbal data have been translated) the preceding formulae of transformation, and to bring them thus into forms in which the second member is either 0 or 1; they are then to be combined in accordance with the following formulae:

$$(a=0)(b=0)=(a+b=0),$$
$$(a=1)(b=1)=(ab=1),$$

until there is only a single equation to be resolved, of one or the other of the two forms,

$$ax+b\bar{x}=0, \quad (a+x)(b+\bar{x})=1.$$

We shall confine ourselves to the treatment of the first of these two forms (the reader can easily translate it, step by step, into the treatment for the second form). The equation is equivalent to this system of two inclusions,

$$ax\leqslant 0, \quad b\bar{x}\leqslant 0,$$

or,

$$x\leqslant\bar{a}, \quad b\leqslant x,$$

that is to say, to

$$b\leqslant x\leqslant\bar{a}, \qquad (S_1)$$

whence

$$b\leqslant\bar{a}, \quad \text{or,} \quad ab\leqslant 0. \qquad (S_2)$$

Thus the solution is, in words, x contains b and is contained in $\bar{a}$, or, as it can be otherwise expressed,

$$x=\bar{a}x+b\bar{x} \text{ (Poretsky)},$$
$$x=\bar{a}u+b\bar{u} \text{ (Schröder)}.$$

(In the last expression u is a purely arbitrary term.) The two extreme values of x for $u=1$ and $u=0$ are $x=b$, $x=\bar{a}$. But the solution of the equation in terms of x is given completely in (S_1), and (S_2) contains all that is involved in the premises independently of x, that is, it is the resultant which remains after the elimination of x. It is also the condition for the resolvability of the original expression.

[But the problem of eliminating x appears in a still more interesting form if we equate to 0 a *sum* and to 1 a *product* of functions of x and $\bar{x}$, if we write, that is, for the canonical form of the equations to be resolved,

$$(a+x)(b+\bar{x})=0, \quad ax+b\bar{x}=1,$$

instead of those just given. The rule for the elimination of the quantity to be discarded is then exactly the same for both of these expressions; it is simply: *erase it.* (Of course, if either a or b is zero in the left-hand form or 1 in the right-hand form, x cannot be eliminated, for we have then only one premise instead of two.) Moreover, this same rule applies to the elimination of the unknown quantity in the particular propositions,

$$ax+b\bar{x}\neq 0, \quad 1\neq(a+x)(b+\bar{x});$$

they give, respectively, $a+b\neq 0$, $1\neq ab$. The argument is here (1) If some a is x or else some b is non-x, then in any case Something is either a or b; and (2) If not everything is at once either a or x and also b or $\bar{x}$, then, all the more, Not everything is at once a and b. The first of these two forms is probably more convincing intuitively than the second.—C.L.F.]

The common syllogism, when universal, is a particular case of the equations just discussed, if a and b are simple terms, instead of expressions of any degree of complexity. These formulae do not, of course, constitute a demonstration of the principle of the syllogism, for they depend upon it.

The formulae of symbolic logic have usually been developed in terms of the non-symmetrical affirmative copula, $a\leqslant b$, and its denial, $a\overline{\leqslant}b$; this method is the best in point of naturalness, but either of the universal symmetrical copulas (see PROPOSITION, in loc.) combined with either of the corresponding particular copulas gives an algebra which has great advantage in point of conciseness; a single formula takes the place, throughout, of the dual pair of formulae of Schröder (see *Studies in Logic*, by members of the Johns Hopkins University.)

Exact logic does not admit the deduction

from the universal affirmative proposition, $a \leqslant b$, of 'Some b is a' nor of 'Some a is b'; for the proposition $a \leqslant b$ does not imply the existence of a, since it is true (no matter what may be the meaning of b) for the value $a = 0$, while 'Some a is b' and 'Some b is a' $(ab \overline{\leqslant} 0)$ do imply the existence of a, since

$$(a \leqslant 0) + (b \leqslant 0) \leqslant (ab \leqslant 0).$$

But these two deductions are permissible whenever we are in possession of the additional information that a exists, or that $a \overline{\leqslant} 0$.

For we have $(a \leqslant b) = (a\bar{b} \leqslant 0)$.

Now $(ab \leqslant 0)(a\bar{b} \leqslant 0) \leqslant (a \leqslant 0)$,

Whence, by the *principle of transposition*, we have $(a\bar{b} \leqslant 0)(a \overline{\leqslant} 0) \leqslant (ab \overline{\leqslant} 0)$.

It is by means of this principle of transposition that Mrs. Ladd-Franklin has reduced the traditional fifteen valid moods of the syllogism, or the 8,192 $(= 16 \times 16 \times 16 \times 2)$ valid syllogisms which are possible if the full scheme of propositions—as Everything is a or b, Not all but a is b, &c.—is taken account of, to the single formula

$$(ab = 0)(bc = 0)(ac \neq 0) \leqslant 0,$$

which may be called an Antilogism, and to which corresponds either the universal or the particular syllogism (in all its forms) according as one or another of these three incompatible propositions is transferred to the conclusion,

$$(ab = 0)(\bar{b}c = 0) \leqslant (ac = 0),$$
$$(ab = 0)(ac \neq 0) \leqslant (\bar{b}c \neq 0).$$

(See Schröder, *Algebra d. Logik*, § 43; and E. Müller, *Ueber d. Algebra d. Logik*, ii. 19.) Cf. PROPOSITION.

The theorems given hitherto hold equally for concepts and for propositions. But there is a special set of theorems for such propositions as are either *always true* or *always false*. These theorems follow from the two following formulae, which constitute the definition of propositions of this kind,

$$A = (1 \leqslant A), \quad A_1 = (A \leqslant 0)$$

(with capital letters it is convenient to write a dash for the sign of negation), or, as they may also be written,

$$A = (1 = A), \quad A_1 = (A = 0).$$

These propositions, that is to say, have only two values, 0 and 1. Propositions of variable value are such as contain one or several indeterminate quantities $(x, y, z, \ldots)$, for some values of which the propositions are true, for others false. They have an intermediate extension (Gültigkeitsbereich) between 0 and 1, measured mathematically by their probability.

The following formulae hold for propositions of constant value:

$$(1 = A + B) = (1 = A) + (1 = B),$$
$$(AB = 0) = (A = 0) + (B = 0),$$
$$(A \leqslant B) = (A_1 + B).$$

In the last of these equations we permit ourselves to write (following a peculiarity of language) simply $A_1 + B$ instead of $1 \leqslant A_1 + B$. To take an example, the proposition 'u is v implies that x is y' becomes, upon transposition of the first member, 'What is possible is that u is not v or else that x is y,' a statement which we are in the habit of using in the apocopated form, 'u is not v or x is y.' This abbreviation amounts, in the algebra, to the convention that whatever expression, a, shall be simply written upon our sheet of paper shall be understood to have the force of the statement $1 \leqslant a$; we might equally well, if we had adopted the negative copula, agree that whatever, x, is written upon the paper has the force of $x \leqslant 0$. Neither procedure would be permissible if particular propositions, the denials of universal propositions, were to be treated at the same time, but by hypothesis we are here dealing only with statements which have no other values than 0 and 1, that is, which are universal.

We have, again,

$$(A = B) = AB + A_1B_1,$$
$$(A = B_1) = AB_1 + A_1B,$$

and also, $(AB \leqslant C) = (A \leqslant C) + (B \leqslant C)$,

$$(C \leqslant A + B) = (C \leqslant A) + (C \leqslant B),$$

and the theorem due to Mr. Peirce,

$$(AB \leqslant C) = [A \leqslant (B \leqslant C)] = [B \leqslant (A \leqslant C)],$$

and finally the principle of hypothetical reasoning, direct and inverse,

$$(A \leqslant B)\, A \leqslant B, \quad (A \leqslant B)\, B_1 \leqslant A_1.$$

For propositions of variable value another notation may be used. Let $f(x)$ be a logical function containing the variable x, which is capable of taking the several values $a, b, c, \ldots$, and let

$$\Sigma_x f(x) = f(a) + f(b) + f(c) + \ldots,$$
$$\Pi_x f(x) = f(a) \times f(b) \times f(c) \times \ldots;$$

then the equations

$$\Sigma_x f(x) = 0, \quad \Pi_x f(x) = 0,$$

signify, the first, that for every one of the values of x the equation $f(x) = 0$ is satisfied; the second, that for some one at least of its values the equation is satisfied. The formula for the solution of equations given above becomes, in this notation,

$$(ax + b\bar{x} = 0) = (ab = 0)\, \Sigma_u (x = \bar{a}u + b\bar{u}),$$

which means that if the equation $ax + b\bar{x} = 0$

holds, then on the one hand $ab = 0$, and on the other hand for every one of the values of u, $x = \bar{a}u + b\bar{u}$ satisfies the equation, and reciprocally.

Symbolic logic, it will be seen, constitutes a real algebra, which has its own laws; it gives rise to a theory of equations and of inequalities which has not yet been fully worked out. It also serves as an introduction to a more general logic—the logic of RELATIVES (q. v.)—of which it is a particular case. This latter was foreseen by Leibniz, prepared for by De Morgan, founded by Peirce, and developed by Schröder.

Besides the system of symbolic logic here developed, to which the writings of Johnson, Whitehead, Poretsky, Mitchell, and Mrs. Ladd-Franklin have contributed, the principal systems that have been proposed are (1) that of Jevons, which consists in forming all possible combinations of positive and negative factors (the constituents of Boole), suppressing those which are annulled by the given premises, and reuniting the remaining combinations to form the solution of the problem (an operation which may be facilitated by diagrams and by a logical machine); (2) that of Peirce, whose method consists in separating the combined data up into the product (instead of the sum) of a function of x and of non-x, and in eliminating x by means of the formula

$$(ax \prec b)\,(c\bar{x} \prec d) \prec (ac \prec b + d);$$

(3) that of MacColl, which consists in considering propositions alone as the elements of reasoning, and in assigning to them three distinct values: ϵ (1), η (0), θ (neither 1 nor 0)—this method is particularly adapted to questions of probability and to certain questions of mathematics (the calculus of the limits of a multiple integral), which in fact gave rise to it; (4) that of Peano, the object of which is to analyse and to verify the propositions of mathematics, and which employs, besides the logical symbols (necessarily different from the preceding, but nearly equivalent to them), symbols for mathematical notions and relations. (L.C.–C.L.F.)

If symbolic logic be defined as logic—for the present only deductive logic—treated by means of a special system of symbols, either devised for the purpose or extended to logical from other uses, it will be convenient not to confine the symbols used to algebraic symbols, but to include some graphical symbols as well.

[The reader will observe that the symbols adopted for the dictionary are in some measure departed from in what follows.—J.M.B.]

The first requisite to understanding this matter is to recognize the purpose of a system of logical symbols. That purpose and end is simply and solely the investigation of the theory of logic, and not at all the construction of a calculus to aid the drawing of inferences. These two purposes are incompatible, for the reason that the system devised for the investigation of logic should be as analytical as possible, breaking up inferences into the greatest possible number of steps, and exhibiting them under the most general categories possible; while a calculus would aim, on the contrary, to reduce the number of processes as much as possible, and to specialize the symbols so as to adapt them to special kinds of inference. It should be recognized as a defect of a system intended for logical study that it has two ways of expressing the same fact, or any superfluity of symbols, although it would not be a serious fault for a calculus to have two ways of expressing a fact.

There must be operations of transformation. In that way alone can the symbol be shown determining its interpretant. In order that these operations should be as analytically represented as possible, each elementary operation should be either an insertion or an omission. Operations of commutation, like $xy \therefore yx$, may be dispensed with by not recognizing any order of arrangement as significant. Associative transformations, like $(xy)z \therefore x(yz)$, which is a species of commutation, will be dispensed with in the same way; that is, by recognizing an equiparant as what it is, a symbol of an unordered set.

It will be necessary to recognize two different operations, because of the difference between the relation of a symbol to its object and to its interpretant. Illative transformation (the only transformation relating solely to truth that a system of symbols can undergo) is the passage from a symbol to an interpretant, generally a partial interpretant. But it is necessary that the interpretant shall be recognized without the actual transformation. Otherwise the symbol is imperfect. There must, therefore, be a sign to signify that an illative transformation would be possible. That is to say, we must not only be able to express '*A* therefore *B*,' but 'If *A* then *B*.' The symbol must, besides, separately indicate its object. This object must be indicated by a sign, and the relation of this to the significant element of the symbol is that both are

signs of the same object. This is an equiparant, or commutative relation. It is therefore necessary to have an operation combining two symbols as referring to the same object. This, like the other operation, must have its actual and its potential state. The former makes the symbol a proposition '*A* is *B*,' that is, 'Something *A* stands for, *B* stands for.' The latter expresses that such a proposition *might* be expressed, 'This stands for something which *A* stands for and *B* stands for.' These relations might be expressed in roundabout ways; but two operations would always be necessary. In Jevons's modification of Boole's algebra the two operations are aggregation and composition. Then, using non-relative terms, 'nothing' is defined as that term which aggregated with any term gives that term, while 'what is' is that term which compounded with any term gives that term. But here we are already using a third operation; that is, we are using the relation of equivalence; and this is a composite relation. And when we draw an inference, which we cannot avoid, since it is the end and aim of logic, we use still another. It is true that if our purpose were to make a calculus, the two operations, aggregation and composition, would go admirably together. Symmetry in a calculus is a great point, and always involves superfluity; as in homogeneous co-ordinates and in quaternions. Superfluities which bring symmetryare immense economies in a calculus. But for purposes of analysis they are great evils.

A proposition *de inesse* relates to a single state of the universe, like the present instant. Such a proposition is altogether true or altogether false. But it is a question whether it is not better to suppose a general universe, and to allow an ordinary proposition to mean that it is sometimes or possibly true. Writing down a proposition under certain circumstances asserts it. Let these circumstances be represented in our system of symbols by writing the proposition on a certain sheet. If, then, we write two propositions on this same sheet, we can hardly resist understanding that both are asserted. This, then, will be the mode of representing that there is something which the one and the other represent—not necessarily the same quasi-instantaneous state of the universe, but the same universe. If writing *A* asserts that *A* may be true, and writing *B* that *B* may be true, then writing both together will assert that *A* may be true and that *B* may be true. By a *rule* of a system of symbols is meant a permission under certain circumstances to make a certain transformation; and we are to recognize no transformations as elementary except writing down and erasing. From the conventions just adopted, it follows, as RULE I, that *anything written down may be erased, provided the erasure does not visibly affect what else there may be which is written along with it.*

Let us suppose that two facts are so related that asserting the one gives us the right to assert the other, because if the former is true, the latter must be true. If *A* having been written, we can add *B*, we may then, by our first rule, erase *A*; and consequently *A* may be transformed into *B* by two steps. We shall need to express the fact that writing *A* gives us a right, under all circumstances, to add *B*. Since this is not a reciprocal relation, *A* and *B* must be written differently; and since neither is positively asserted, neither must be written so that the other could be erased without affecting it. We need some place on our sheet upon which we can write a proposition without asserting it. The present writer's habit is to cut it off from the main sheet by enclosing it within an oval line; but in order to facilitate the printing, we will here enclose it in square brackets. In order, then, to express that 'If *A* can under any circumstances whatever be true, *B* can under some circumstances be true,' we must certainly enclose *A* in square brackets. But what are we to do with *B*? We are not to assert positively that *B* can be true; yet it is to be more than hypothetically set forth, as *A* is. It must certainly, in some fashion, be enclosed within the brackets; for were it detached from the brackets, the brackets with their enclosed *A* could, by Rule I, be erased; while in fact the dependence upon *A* cannot be omitted without danger of falsity. It is to be remarked that, in case we can assert that 'If *A* can be true, *B* can be true,' then, *a fortiori*, we can assert that 'If both *A* and *C* can be true, *B* can be true,' no matter what proposition *C* may be. Consequently, we have, as RULE II, that, *within brackets already written, anything whatever can be inserted.* But the fact that 'If *A* can be true, *B* can be true' does *not* generally justify the assertion 'If *A* can be true, both *B* and *D* are true'; yet our second rule would imply that, unless the *B* were cut off, in some way, from the main field within the brackets. We will therefore enclose *B* in parentheses, and

express the fact that 'If A can be true, B can be true' by

$$[A\,(B)] \text{ or } [(B)\,A] \text{ or } \left[\begin{matrix}A\\(B)\end{matrix}\right], \text{ \&c.}$$

The arrangement is without significance. The fact that 'If A can be true, both B and D can be true,' or $[A\,(BD)]$, justifies the assertion that 'If A is true B is true,' or $[A\,(B)]$. Hence the permission of Rule I may be enlarged, and we may assert that anything unenclosed or enclosed both in brackets and parentheses can be erased if it is separate from everything else. Let us now ask what $[A]$ means. Rule II gives it a meaning; for by this rule $[A]$ implies $[A\,(X)]$, whatever proposition X may be. That is to say, that $[A]$ can be true implies that 'If A can under any circumstances be true, then anything you like, X, may be true.' But we may like to make X express an absurdity. This, then, is a *reductio ad absurdum* of A; so that $[A]$ implies, for one thing, that A cannot under any circumstances be true. The question is, Does it express anything further? According to this, $[A\,(B)]$ expresses that $A\,(B)$ is impossible. But what is this? It is that A can be true while something expressed by (B) can be true. Now, what can it be that renders the fact that 'If A can ever be true, B can sometimes be true' incompatible with A's being able to be true? Evidently the falsity of B under all circumstances. Thus, just as $[A]$ implies that A can never be true, so (B) implies that B can never be true. But further, to say that $[A\,(B)]$, or 'If A is ever true, B is sometimes true,' is to say no more than that it is impossible that A is ever true, B being never true. Hence, the square brackets and the parentheses precisely deny what they enclose. A logical principle can be deduced from this: namely, if $[A]$ is true $[A\,(X)]$ is true. That is, if A is never true, then we have a right to assert that 'If A is ever true, X is sometimes true,' no matter what proposition X may be. Square brackets and parentheses, then, have the same meaning. Braces may be used for the same purpose. Moreover, since two negatives make an affirmative, we have, as RULE III, that *anything can have double enclosures added or taken away, provided there be nothing within one enclosure but outside the other.* Thus, if B can be true, so that B is written, Rule III permits us to write $[(B)]$, and then Rule II permits us to write $[X\,(B)]$. That is, if B is sometimes true, then 'If X is ever true, B is sometimes true.' Let us make the apodosis of a conditional proposition itself a conditional proposition. That is, in $(C\,\{D\})$ let us put for D the proposition $[A\,(B)]$. We thus have $(C\,\{[A\,(B)]\})$. But, by Rule III, this is the same as $(CA\,(B))$.

All our transformations are analysed into insertions and omissions. That is, if from A follows B, we can transform A into AB and then omit the B. Now, by Rule I, from AB follows A. Treating this in the same way, we first insert the conclusion and say that from AB follows ABA. We thus get as RULE IV that *any detached portion of a proposition can be iterated.*

It is now time to reform Rule II so as to state in general terms the effect of enclosures upon permissions to transform. It is plain that if we have written $[A\,(B)]\,C$, we can write $[A\,(BC)]\,C$, although the latter gives us no right to the former. In place, then, of Rule II we have:

RULE II (amended). *Whatever transformation can be performed on a whole proposition can be performed upon any detached part of it under additional enclosures even in number, and the reverse transformation can be performed under additional enclosures odd in number.*

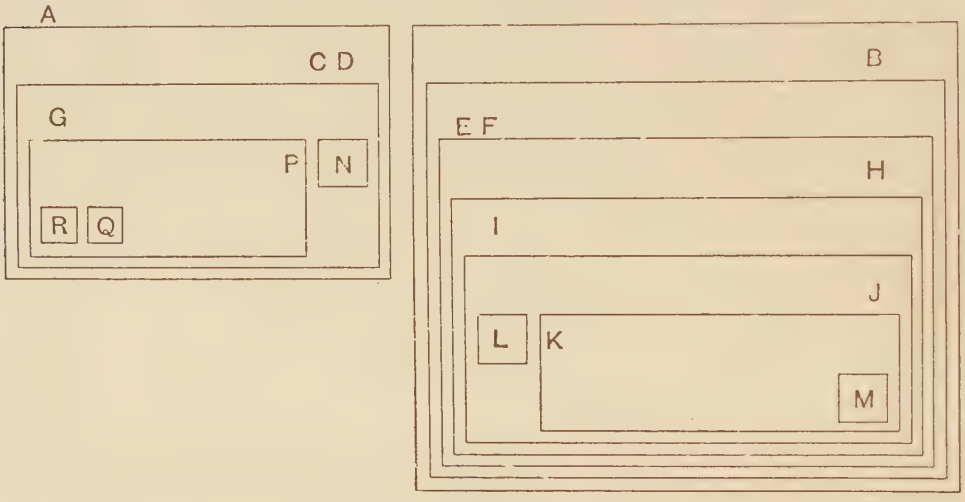
But this rule does not permit every transformation which can be performed on a detached part of a proposition to be performed upon the same expression otherwise situated.

Rule IV permits, by virtue of Rule II (amended), all iteration under additional enclosures and erasure of a term inside enclosures if it is iterated outside some of them.

We can now exhibit the *modi tollens et ponens.* Suppose, for example, we have these premises: 'If A is ever true, B is sometimes true,' and 'B is never true.' Writing them, we have $[A\,(B)]\,(B)$. By Rule IV, from (B) we might proceed to $(B)\,(B)$. Hence, by Rule II (amended), from $[A\,(B)]\,(B)$ we can proceed to $[A]\,(B)$, and by Rule I to $[A]$. That is, 'A is never true.' Suppose, on the other hand, our premises are $[A\,(B)]$ and A. As before, we get $[(B)]\,A$, and by Rule III, BA, and by Rule I, B. That is, from the premises of the *modus ponens* we get the conclusion. Let us take as premises 'If A is ever true, B is sometimes true,' and 'If B is ever true, C is sometimes true.' That is, $(A\,\{B\})\,[B\,(C)]$. Then, iterating $[B\,(C)]$ within two enclosures, we get $(A\,\{B\,[B\,(C)]\})\,[B\,(C)]$, or, by Rule I, $(A\,\{B\,[B\,(C)]\})$. But we have just seen that $B\,[B\,(C)]$ can be transformed to C. Performing this under two enclosures, we get $(A\,\{C\})$, which is the conclusion, 'If A is

ever true, C is sometimes true.' Let us now formally deduce the principle of contradiction $[A\,(A)]$. Start from any premise X. By Rule III we can insert $[(X)]$, so that we have $X\,[(X)]$. By insertion under odd enclosures we have $X\,[A\,(X)]$. By iteration under additional enclosures we get $X\,[A\,(A\,X)]$, by erasures under even enclosures $[A\,(A)]$.

In complicated cases the multitude of enclosures become unmanageable. But by using ruled paper and drawing lines for the enclosures, composed of vertical and horizontal lines, always writing what is more enclosed lower than what is less enclosed, and what is evenly enclosed on the left-hand part of the sheet, and what is oddly enclosed on the right-hand part, this difficulty is greatly reduced. The following diagram illustrates the general style of arrangement recommended.



It is now time to make an addition to our system of symbols. Namely, AB signifies that A is at some quasi-instant true, and that B is at some quasi-instant true. But we wish to be able to assert that A and B are true at the same quasi-instant. We should always study to make our representations iconoidal; and a very iconoidal way of representing that there is one quasi-instant at which both A and B are true will be to connect them with a heavy line drawn in any shape, thus:

$$A\text{—}B \text{ or } \begin{matrix} A \\ \llcorner B \end{matrix}$$

If this line be broken, thus $A\text{— —}B$, the identity ceases to be asserted. We have evidently—

Rule V. *A line of identity may be broken where unenclosed.* $\text{—}A$ will mean 'At some quasi-instant A is true.' It is equivalent to A simply. But $\text{—}(A)$ will differ from $(\text{—}A)$ or (A) in merely asserting that at some quasi-instant A is not true, instead of asserting with the latter forms that at no quasi-instant is A true. Our quasi-instants may be individual things. In that case $\text{—}A$ will mean 'Something is A'; $\text{—}(A)$, 'Something is not A'; $[\text{—}(A)]$, 'Everything is A'; $(\text{—}A)$, 'Nothing is A.' So $A\text{—}B$ will express 'Some A is B'; $(A\text{—}B)$, 'No A is B'; $A\text{—}(B)$, 'Some A is not B'; $[A\text{—}(B)]$, 'Whatever A there may be is B'; $(A)\overline{(B)}$, 'There is something besides A and B'; $[(A)\overline{(B)}]$, 'Everything is either A or B.' The rule of iteration must now be amended as follows.

Rule IV (amended). *Anything can be iterated under the same enclosures or under additional ones, its identical connections remaining identical.*

Thus, $[A\text{—}(B)]$ can be transformed to $[\overline{A\,(A\llcorner B)}]$. By the same rule $A\text{—}\,(\text{—}B)$, i.e. 'Something is A and nothing is B,' by iteration of the line of identity, can be transformed to $A\,(\overline{\llcorner}\,\text{—}B)$, i.e. 'Some A is not coexistent with anything that is B,' whence, by Rules V and II (amended), it can be further transformed to $A\,(\llcorner B)$, i.e. 'Some A is not B.'

But it must be most carefully observed that two unenclosed parts cannot be illatively united by a line of identity. The enclosure of such a line is that of its least enclosed part. We can now exhibit any

ordinary syllogism. Thus, the premises of *Baroko*, 'Any M is P' and 'Some S is not P,' may be written $\{\overline{M\,[P]}\}\,\overline{S\,(P)}$. Then, as just seen, we can write $\{M\,\overline{[P]}\}\,\overline{S\,(P)}$. Then, by iteration, $\{\overline{M\,[P\,(P)]}\}\,\overline{S\,(P)}$. Breaking the line under even enclosures, we get $\{[P\,(P)]\overline{M}\}\,\overline{S\,(P)}$. But we have already shown that $[P\,(P)]$ can be written unenclosed. Hence it can be struck out under one enclosure; and the unenclosed (P) can be erased. Thus we get $\{\overline{M}\}\,\overline{S}$, or 'Some S is not M.' The great number of steps into which syllogism is thus analysed shows the perfection of the method for purposes of analysis.

In taking account of relations, it is necessary to distinguish between the different sides of the letters. Thus let l be taken in such a sense that $X—l—Y$ means 'X loves Y.' Then $X\overline{\,\,\,\,}\,Y$ will mean 'Y loves X.' Then, if $m—$ means 'Something is a man,' and $—w$ means 'Something is a woman,' $m—l—w$ will mean 'Some man loves some woman'; $\overline{m\,[(l\overline{\,\,)}\,w}]$ will mean 'Some man loves all women'; $[(m—l\overline{\,\,)}\,w]$ will mean 'Every woman is loved by some man,' &c.

Since enclosures signify negation, by enclosing a part of the line of identity, the relation of otherness is represented. Thus, $A\,(\,\,)\,B$ will assert 'Some A is not some B.' Given the premises 'Some A is B' and 'Some C is not B,' they can be written $A—B\,\overline{C\,(B)}$. By Rule III, this can be written $A\,\{[B]\}\,\overline{C\,(B)}$. By iteration, this gives $A\,\{[B\,(B)]\}\,\overline{C\,(B)}$. The lines of identity are to be conceived as passing through the space between the braces outside of the brackets. By breaking the lines under even enclosures, we get $A\,\overline{\{}\,[B\,(B)]\,\overline{\}}\,\overline{C\,(B)}$. As we have already seen, oddly enclosed $[B\,(B)]$ can be erased. This, with erasure of the detached (B), gives $A\{\,\,\}\,C$. Joining the lines under odd enclosures, we get $A\{\,\,\}\,C$, or 'Some A is not some C.'

For all considerable steps in ratiocination, the reasoner has to treat qualities, or collections (they only differ grammatically), and especially relations, or systems, as objects of relation about which propositions are asserted and inferences drawn. It is, therefore, necessary to make a special study of the logical relatives '—— is a member of the collection ——,' and '—— is in the relation —— to ——.' The key to all that amounts to much in symbolical logic lies in the symbolization of these relations. But we cannot enter into this extensive subject in this article.

The system of which the slightest possible sketch has been given is not so iconoidal as the so-called Euler's diagrams; but it is by far the best *general* system which has yet been devised. The present writer has had it under examination for five years with continually increasing satisfaction. However, it is proper to notice some other systems that are now in use. Two systems which are merely extensions of Boole's algebra of logic may be mentioned. One of these is called by no more proper designation than the 'general algebra of logic.' The other is called 'Peirce's algebra of dyadic relatives.' In the former there are two operations—aggregation, which Jevons (to whom its use in algebra is due) signifies by a sign of division turned on its side, thus $\cdot|\cdot$ (I prefer to join the two dots, in order to avoid mistaking the single character for three); and composition, which is best signified by a somewhat heavy dot, $\cdot$.

Thus, if A and B are propositions, $A\cdot|\cdot B$ is the proposition which is true if A is true, is true if B is true, but is such that if A is false and B is false, it is false. $A\cdot B$ is the proposition which is true if A is true and B is true, but is false if A is false and false if B is false. Considered from an algebraical point of view, which is the point of view of this system, these expressions $A\cdot|\cdot B$ and $A\cdot B$ are *mean functions*; for a mean function is defined as such a symmetrical function of several variables, that when the variables have the same value, it takes that same value. It is, therefore, wrong to consider them as addition and multiplication, unless it be that *truth* and *falsity*, the two possible states of a proposition, are considered as logarithmic infinity and zero. It is therefore well to let o represent a false proposition and ∞ (meaning logarithmic infinity, so that $+\infty$ and $-\infty$ are different) a true proposition. A heavy line, called an 'obelus,' over an expression negatives it.

The letters i, j, k, &c., written below the line after letters signifying predicates, denote individuals, or supposed individuals, of which the predicates are true. Thus, l_{ij} may mean that i loves j. To the left of the expression a series of letters Π and Σ are written, each

with a special one of the individuals i, j, k attached to it in order to show in what order these individuals are to be selected, and how. Σ_i will mean that i is to be a suitably chosen individual, Π_j that j is any individual, no matter what. Thus,

$$\Sigma_i \Pi_j l_{ji}$$

means that there is an individual i such that every individual j loves i; and

$$\Pi_j \Sigma l_{ji}$$

will mean that taking any individual j, no matter what, there is some individual i, whom j loves. This is the whole of this system, which has considerable power. This use of Σ and Π was probably first introduced by O. C. Mitchell in his epoch-making paper in *Studies in Logic*, by members of the Johns Hopkins University.

In Peirce's algebra of dyadic relatives the signs of aggregation and composition are used; but it is not usual to attach indices. In place of them two relative operations are used. Let l be 'lover of,' s 'servant of.' Then $l\,s$, called the relative product of s by l, denotes 'lover of some servant of'; and $l\dagger s$, called the relative sum of l to s, denotes 'lover of whatever there may be besides servants of.' In MS. the tail of the cross will naturally be curved. The sign $\mid$ is used to mean 'numerically identical with,' and T to mean 'other than.' Schröder, who has written an admirable treatise on this system (though his characters are very objectionable, and should not be used), has considerably increased its power by various devices, and especially by writing, for example, $\overset{u}{\Pi}$ before an expression containing u to signify that u may be any relative whatever, or $\overset{u}{\Sigma}$ to signify that it is a possible relative. In this way he introduces an abstraction or term of second intention. (C.S.P.)

Peano has made considerable use of a system of logical symbolization of his own. Mrs. Ladd-Franklin advocates eight copula-signs to begin with, in order to exhibit the equal claim to consideration of the eight propositional forms. Of these she chooses 'No a is b' and 'Some a is b' ($a \overline{\vee} b$ and $a \vee b$) as most desirable for the elements of an algorithmic scheme; they are both symmetrical and natural. She thinks that a symbolic logic which takes 'All a is b' (Boole, Schröder) as its basis is cumbrous; for every statement of a theorem, there is a corresponding statement necessary in terms of its contrapositive. This, she says, is the source of the parallel columns of theorems in Schröder's *Logik*; a single set of theorems is all-sufficient if a symmetrical pair of copulas is chosen. Some logicians (as C.S.P.) think the objections to Mrs. Ladd-Franklin's system outweigh its advantages. Other systems, as that of Wundt, show a complete misunderstanding of the problem. Cf. Syllogism (2). (C.S.P., C.L.F.)

Symbolic logic finds occasion to single out two terms as of peculiar significance, and to represent them by the special symbols 0 (zero) and ∞ (infinity); all other terms have both application and signification, but the first of these has no object of consciousness to which it is applicable, and simply signifies the non-existent, while the second has every object of consciousness as its application, and has no signification whatever. These properties are expressed in formal language by saying that

$$a \leqslant \infty,\ 0 \leqslant a$$

are, no matter what a may be, propositions of no content, though always true. But

$$\infty \leqslant a,\ \bar{a} \leqslant 0$$

state, the first, that everything is a, and the second, that $\bar{a}$ is non-existent. These last two propositions are contrapositives one of the other, and ∞ and 0 are a pair of contradictory terms (i. e. each is the negative of the other). Much confusion would be saved in discussions in non-symbolic logic by the recognition of these special terms. (C.L.F.)

Literature: Leibniz, Philos. Schriften, t. vii, ed. Gerhardt (Berlin, 1890); Opuscules et fragments inédits de Leibniz, ed. Couturat (Paris, 1902); Lambert, Neues Organon (Leipzig, 1764); Ploucquet, Methodus calculandi in logicis (1763); Gergonne, Essai de dialectique rationnelle, Ann. de Math., t. vii; De Morgan, Formal Logic (London, 1847); Syllabus of a Proposed System of Logic (1860); On the Syllogism, in Trans. Camb. Philos. Soc., viii, ix, x (1847–64); George Boole, The Mathematical Analysis of Logic (London, 1847); An Investigation of the Laws of Thought (Cambridge, 1854); Stanley Jevons, Pure Logic (London, 1864); C. S. Peirce, articles in Proc. Amer. Acad. Arts and Sci., vii, x, xiii; Memoirs of the same, ix, Amer. J. of Math., iii, iv, vii; Robert Grassmann, Die Begriffslehre oder Logik (Stettin, 1872); Delbœuf, Logique algorithmique (Liège, Bruxelles, 1877); and in the Rev. Philos., ii, iii; Hugh MacColl, articles on the Calculus of Equivalent Statements, London Math. Soc., ix, x, xi, xvi, xxviii, xxix, xxx; and in Mind, 1880, 1897, and xi, N. S., No. 33; Ernst Schröder, Der Operationskreis des Logikkalkuls (1877); Algebra d. Logik, i (1890), ii (1) (1891); iii (1), Algebra u. Logik d. Relative

(1895); Studies in Logic, by members of the Johns Hopkins University (Peirce, Mrs. Ladd-Franklin, Mitchell, &c.) (Boston, 1883); G. Peano, Calcolo geometrico (Turin, 1888); Arithmetices Principia, I Principii di Geometria (ibid., 1889); Formulaire de Mathématiques, en collaboration (i, 1895; ii, 1897–9; iii, 1901); and Rev. de Math., i–vii, 1891–1901); W. E. Johnson, The Logical Calculus, Mind, 1892; Keynes, Studies and Exercises in Formal Logic (3rd ed., 1894); A. N. Whitehead, Universal Algebra, i. Bk. II (Cambridge, 1898); Eugen Müller, Ueber d. Algebra d. Logik (Leipzig, 1900, 1901); Platon Poretsky, Sept lois fondamentales de la théorie des égalités logiques (Kazan, 1899); Bibliothèque du Congrès int. de Philos., iii, containing the papers of Johnson, MacColl, Poretsky, Schröder, Peano, Burali-Forti, Padoa, and Pieri (Paris, 1901). For the history of Symbolic Logic see Liard, Les logiciens anglais contemporains (Paris, 1878); Venn, Symbolic Logic (London, 2nd ed., 1894); and Peano's Formulaire de Mathématiques (for indications of sources of formulae). (L.C., C.L.F.)

Symbolical: Ger. *symbolisch*; Fr. *symbolique*; Ital. *simbolico*. (1) Relating to symbols in the general sense. See Symbol (1).

(2) Relating to symbols, novel or peculiar.

In this sense the treatment of logic by means of peculiar characters or old characters put to peculiar uses is by some writers called Symbolic(al) Logic (q.v.).

(3) Relating to an algebraical method in which operations are denoted by letters and made the subject of operations. (C.S.P.)

Symbolism: Ger. *Symbolismus*; Fr. *symbolisme*; Ital. *simbolismo*. (1) In aesthetics: (*a*) symbols considered abstractly; (*b*) the theory of the nature and use of the Symbol (q.v. 2).

(2) In religion: the use of objects in a symbolic sense; that is, as sensuous emblems of spiritual acts and objects; as, for example, ritual in worship and the sacraments in one aspect of their significance.

Symbolism in this sense has a wide use in religion, the objects of which are unseen and intangible. Hence the need of helping the imagination by means of sensuous objects which may serve as fitting materializations of the spiritual. Symbolism enters into every phase of religion, including the architecture of its churches and temples. The significance of sacred architecture is never wholly that of adaptation to certain functions, but it is determined also to a degree by the spiritual import of those functions and by the influence of religious ideas. (A.T.O.)

Literature: see Symbol; also G. Ferrero, I simboli (1892); G. Marchesini, Il simbolismo (1901). (E.M.)

Symbols (and **Symbolics**) [Gr. *σύμβολον*, a sign]: Ger. *Symbole*; Fr. *symboles*; Ital. *simboli*. The authoritative doctrines or creeds of the Christian Church. Symbolics: a department of ecclesiastical history which treats of the origin, history, and contents of the various creeds of Christendom.

The term symbol was first employed in a theological sense by Cyprian in the year 250 A.D., and after the 4th century came into general use. It was first applied to the Apostles' Creed as a military watchword, distinguishing Christians from Pagans. Luther and Melanchthon first applied the name to Protestant confessions. Since Reformation times the use has been general.

Literature: Oehler, Lehrb. d. Symbolik (1876); Wundt, Symbolik d. römisch-katholischen Kirche (1880); Literature in the Creeds (1878); Schaff, Creeds of Christendom. (A.T.O.)

Symmetry [Gr. *σύν*, with, + *μέτρον*, measure]: Ger. *Symmetrie*: Fr. *symétrie*; Ital. *simmetria*. The arrangement in reverse order, on opposite sides of a perpendicular line or plane, of like and equal parts of an object. More loosely, the equable distribution of parts in the formation of a balanced whole.

In the latter sense it is almost synonymous with proportion, consistency, and congruity. In the narrower sense applied most appropriately in architecture and sculpture; more ambiguously in drawing and painting. Applied rarely and somewhat metaphorically to canon and fugue in music, referring to the temporal repetition of musically similar passages, to metrical relations, as in the asclepiadic verse, and to the structure of the drama, as involving 'exposition,' 'conflict,' and 'solution.' For closely connected meanings see Balance, Harmony, and Proportion.

The Greek term was probably first applied to the commensurability of numbers, thence to the parts of a statue, and finally to the relations of form in general. The aesthetic value of the quality has been recognized by practically all aestheticians from the earliest Greek writers down to the present day. The principle, with its connected categories, harmony and proportion, is, however, so fundamental to the Greek conception of beauty, that it plays relatively a more important

part in their aesthetic doctrines than in those of modern aestheticians. With the latter the importance of these elements is relatively lessened by reason of the value attached to the beautiful as significant, as mediating or revealing the characteristic.

Literature: KÖSTLIN, Aesthetik (1869); CARRIERE, Aesthetik, i (1885); SANTAYANA, Sense of Beauty (1896). (J.R.A.)

Sympathy [Gr. *σύν* + *παθεῖν*, to suffer]: Ger. *Mitleid, Sympathie*; Fr. *sympathie*; Ital. *simpatia*. The emotional disposition aroused by the thought of experience on the part of another, and on occasion issuing in emotion qualitatively the same as that which the other is thought to have from the experience.

Sympathy has played an important rôle in psychology, ethics, and sociology. Its peculiar implication of one's own experience in another individual's serves to attract analysis from the point of view of the social life. It has been considered, on the one hand, a natural altruistic instinct (impulse), and an original 'spring of action'; and on the other hand, a derived product of experience, reflecting the fortunes of self as depicted 'in the shoes' of another. The discussion has more recently taken the form of the genetic question as to the actual origin and function of sympathy, and it has been connected with the phenomena of EJECTION (q.v.; see also SYMPATHY, aesthetic), by which the self is 'read-in' to 'other' persons. This has the advantage of overcoming the dualism of 'self and other' which has always embarrassed writers on sympathy; for on the basis of this dualism it may be asked, why should the fortunes of another excite the emotions which attach to those of myself? So soon as we entertain the view that the thought of myself and that of the other-self are really only thought of *a* self, variously determined, it follows that the emotions issuing from self as such will be in general the same, so far as the determination of the particular experience does not forbid it. In other words, the problem becomes to account for the differences of emotional and conative reaction to differences of personality rather than to account for the sameness of them; and this is a problem of which the solution lies in the actual accommodations, dispositions, and habits due to experience. The problem becomes that of tracing the differentiation of emotional dispositions into 'private' on the one hand, and 'sympathetic' on the other hand.

In sociology the point is essentially the same: how can solidarity, social unity, based on sympathy, arise if society is made up of a struggling mass of individuals, each pursuing his own interests under the principle of competition? Cf. INDIVIDUALISM, and RIVALRY. So, in answer to this question, we have various ways of reconciling the dualism of interest of 'one' person and 'another'—'social contract,' 'gregarious instinct,' 'constraint,' 'fellow-feeling' (which assumes sympathy), &c. Of course, since sympathy is a fact, social theory may assume it, and rest the case there, but an adequate social psychology giving an account of sympathy serves as foundation for social philosophy. The view which refutes individualism and makes sympathy a normal reaction to the social environment as such—an evidence of an intrinsic social bond and of a developing SOCIUS (q.v.)—supplies this first desideratum. Cf. SOCIAL ORGANIZATION.

It has been maintained that there is a form of ORGANIC (q.v., in psychology) or spontaneous sympathy which in the child precedes the more reflective form. It seems to be associated with the mere thought of pain or suffering, and to be associated with certain organic expressive movements. This is more notably the case with other reactions to persons (notably BASHFULNESS, q.v.), and is no doubt due to natural selection. Other emotions, as fear, anger, jealousy, seem also to show this genetic distinction of modes. Cf. the genetic analysis of Jones (as cited below).

(J.M.B., G.F.S., W.R.S.)

The significance of sympathy for ethical theory is connected with the important practical distinction between egoistic and altruistic interests. When moral conduct is identified with rational conduct, and the life of reason is separated from the emotional life (as by the Stoics and by Kant), this distinction between egoism and altruism is not regarded as fundamental, and sympathy is not held either to constitute or to lead to morality. But wherever the distinction of egoistic and altruistic conduct has become prominent (as in the English successors and opponents of Hobbes), the part played by sympathy both in determining conduct and in evaluating it has come to be looked upon as of primary importance. The classical contention for the ethical value of sympathy is found in the *Moral Sentiments* of Adam Smith. According to him the effort to sympathize produces both the 'amiable' and the 'noble' virtues of character; and the sympathy of

a 'well-informed and impartial spectator' gives the criterion of morality in conduct. The influence of this doctrine is apparent in the accounts of the formation of the 'conscientious' or 'moral' feelings given by later psychological moralists. The same influence led both Comte and Schopenhauer to regard sympathy as the primary moral phenomenon. Comte sees in it an instinctive tendency to the social life, and, as such, it becomes the basis of his ALTRUISM (q. v.). Schopenhauer calls sympathy the fundamental fact of ethics; but he entirely forsakes the psychological method of Adam Smith in asserting that the fact of sympathy proves the unity of all men, and that individuality is an illusion. (W.R.S.)

Literature: that of ETHICS, SOCIAL PSYCHOLOGY, and much of that of SOCIOLOGY. The classical book is ADAM SMITH, Theory of the Moral Sentiments. The psychologies of SPENCER, WUNDT, JODL, LADD, BALDWIN, have chapters on sympathy. Other recent discussions are SUTHERLAND, Origin and Development of the Moral Instinct; MEZES, Princ. of Ethics; JONES, Sociality and Sympathy, Psychol. Rev., Mon. Suppl. (J.M.B.)

Sympathy (æsthetic): Ger. *Miterleben* (cf. TERMINOLOGY, German, 'Einfühlung'), *aesthetische Sympathie* (Lipps); Fr. *sympathie esthétique* (suggested, no exact term—TR.F.); Ital. *immedesimazione, simpatia estetica.* The feeling-in of a state or experience of one's own into an aesthetic object, together with positive feeling or sympathy with the object.

Lipps says (analysing the aesthetic effect produced by a Doric column): 'I sympathize with the column's manner of holding itself, and attribute to it qualities of life, because I recognize in it proportions and other relations agreeable to me. Thus all enjoyment of form, and indeed all aesthetic enjoyment whatsoever, resolves itself into an agreeable feeling of sympathy' (as cited below, 5); to which Groos adds (as cited below, Eng. trans., 326), that the whole, to be aesthetic, must be 'lingered over only for the sake of its pleasure-giving qualities, i. e. playfully.' The latter author draws an analogy between the child's dramatic (play) imitation and aesthetic sympathy. Groos (ibid., 323) gives also the following analysis of aesthetic sympathy: 'In this very complicated process we can distinguish these leading characteristics: i a. The mind conceives of the experience of the other individual as if it were its own. i b. We live through the psychic states which a lifeless object would experience if it possessed a mental life like our own. ii a. We inwardly participate in the movements of an external object. ii b. We also conceive of the motions which a body at rest might make if the powers which we attribute to it were actual (the fluidity of form). iii. We transfer the temper, which is the result of our own inward sympathy, to the object, and speak of the solemnity of the sublime, the gaiety of beauty, &c. By including all these under the rather inadequate name of aesthetic sympathy, . . . &c.' Cf. the analysis made by Witasek (as cited below); given also by Urban, *Psychol. Rev.*, July, 1901.

Literature: JOUFFROY, Cours d'esthétique (1845); VOLKELT, Der Symbolbegriff in d. neuesten Aesthetik (1876); P. STERN, Einfühlung u. Association in d. neuern Aesthetik (1898); LIPPS, Raumästhetik u. geometr.-optische Täuschungen (1897); URBAN, Logic of the Emotions, Psychol. Rev., May, July, 1901; WITASEK, Zeitsch. f. Psychol., XXV; RIBOT, Imagination créatrice (1900); GROOS, Die Spiele d. Menschen (1899; Eng. trans., 1901); LOTZE, Gesch. d. Aesthetik in Deutschland (1868), 74–86. See also SYMBOL, and REVIVAL (affective). (J.M.B., J.H.T.)

Symptom [Gr. *σύμπτωμα*, a chance, casualty]: Ger. *Symptom*; Fr. *symptôme*: Ital. *sintomo.* The indications of a disorder; the departures from normal appearance or function which characterize a disease.

In medicine, the general description of such signs, indications, or characteristics is termed the symptomatology of a disease. The distinction is at times drawn between the physical signs or gross bodily indications and the physiological symptoms. An important distinction is between objective symptoms, which are observable (or by suitable means can be rendered observable) to the physician or student, and subjective ones, which are derivable only from the reports of the subject.

Psychologically, the most significant groups of symptoms are the sensory, the motor, and the mental ones. Sensory symptoms characteristic of various diseases are the anaesthesias, hyperaesthesias, and paraesthesias, the limitations of the fields of vision, partial deafness, disorders of the muscle sense (as in ataxia), feelings of vertigo, malaise, headaches, pains, and so on; motor symptoms include paralysis, paresis, spasms, convulsions, contractures, and in speech, stuttering and the various dysphasias and dyslalias; mental symptoms include illusions, hallucinations, irregular and chaotic flow of ideas, perversions of impulses, excessive joy

or depression, moral insensibility, and an indefinite series of deviations from normal thought observable in speech and conduct. [An interesting group is that characterized by negation of many sorts—negativistic ideas, and delusions (délire de négation)—very frequent in the depressive psychoses.—E.M.]

The descriptions of a given abnormal state, such as MANIA, MELANCHOLIA, PARALYSIS, PARANOIA, NEURASTHENIA (see those terms), include an account of its typical symptoms. Such a group of symptoms likely to occur together is termed, in German, a Symptomencomplex—a useful term also current in English. See PSYCHOSIS, and also what is said of symptoms under MANIA, and MELANCHOLIA. (J.J.)

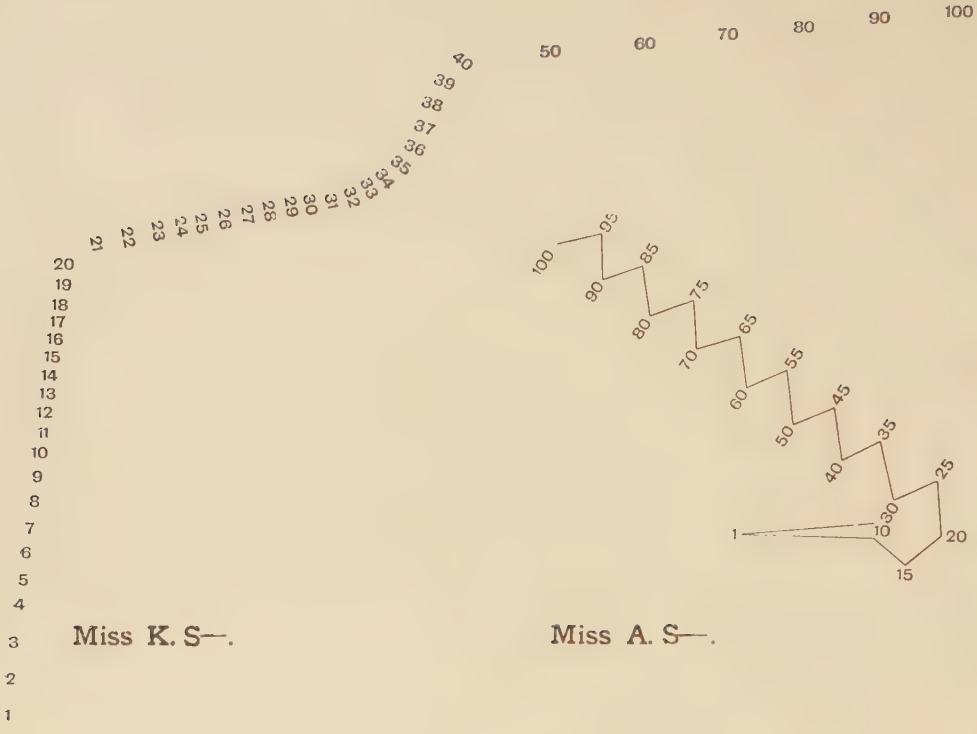
Syn- [Gr. *σύν*]: Ger. *Syn-*; Fr. *syn-*; Ital. *sin-*. A prefix indicating together with, accompanying; as in SYNERGY (q.v.), and SYNAESTHESIA (q.v.). (J.J.)

Synaesthesia [Gr. *σύν* + *αἴσθησις*, sensation, perception]: Ger. *Synästhesie, Mitempfindung* (Stumpf); Fr. *synesthésie*; Ital. *sinestesia*. (1) A general term for the facts of CONCOMITANT SENSATION (q.v.); but, (2) Usually restricted to concomitance of DISPARATE (q.v.) sensations. Here belong the phenomena of coloured hearing or pseudo-chromaesthesia, the photisms of touch, &c. (E.B.T.)

Literally, an accompanying or secondary sensation; the term seems best suited to describe the general class of peculiar and intimate associations between one sense-perception and another, by means of which the appearance or thought of the one brings with it in a regular way the other also. A frequent case is the association of colour with sound, known as colour-hearing, or colour-audition. When persons who have such synaesthesias hear certain musical tones, they see or visualize certain colours, often in definite positions and spread out in space. The tone of a fife may be blue, of a violin yellow; high tones may have bright colours and low ones dull colours; the sounds of words or letters as spoken may vividly suggest colours; and in extreme cases there exists an elaborate colour-alphabet corresponding to the sounds of letters or syllables. The reverse associations may also occur by which groups of colours, when seen, suggest letters and their sounds. In a case published by Galton, wall-paper patterns could be read as syllables and words; and Galton's own name was rendered in colours by this subject in terms of his well-developed sound-colour associations. The days, the months, the seasons, proper names, even smells and tastes may be associated with colours by synaesthesia, so that the perception of one of them induces more or less vividly the visualization of the corresponding colour. Colours seem more apt to be thus associated than any other group of sensations, and these have been termed pseudo-chromaesthesia (see Krohn, as cited below). Flournoy uses the term 'synopsie' to include all visual synaesthesias. The specific associated light or colour is termed a 'photism'; the realization of a sound in connection with a given visual or other perception is a 'phonism.'

Recent investigation has proved the rather wide distribution of such phenomena. They are by no means rare, but well-developed cases of systematic and extensive series of synaesthesia are not the rule. The phenomena exist as idiosyncrasies; one person sees numbers coloured; another letters; a third the hour-marks on the clock; a fourth the days of the week; a fifth the Christian names of friends; a sixth hears tones of the piano in a scale of colours; a seventh gives colours to the voices of those addressing him; and so on indefinitely. Nor do the various colour schemes of those who have similar synaesthesias, e.g. coloured letters, at all agree. The individual constancy for years of the same colour associations in the same person has been repeatedly verified; the same sound assumes practically the same colour on all occasions. Another interesting variation is the 'Number-form.'

A number-form is the realization of the serial numbers in a definite geometrical position in space. Here, again, there is an indefinite variety, from a simple projection outwards, the larger numbers receding in the distance, to elaborate schemes of spirals and circles, waves and crescents, in complex three-dimensional positions. In each case the number-form is constant for the individual, and often serves as a fixation point in calculations. Letters and numbers are liked or disliked, are conceived as human and endowed with sentimental characteristics, and so on. Synaesthesias of all sorts cannot be regarded as specifically abnormal, certainly not as morbid; but they belong to the realm of the unusual and the idiosyncratic, within which explanation is difficult. Although subjective, they are not hallucinations, and in some measure they form, in the realm of sensation, the counterpart of insistent ideas and motor habits. Cf. IMPERATIVE IDEA.



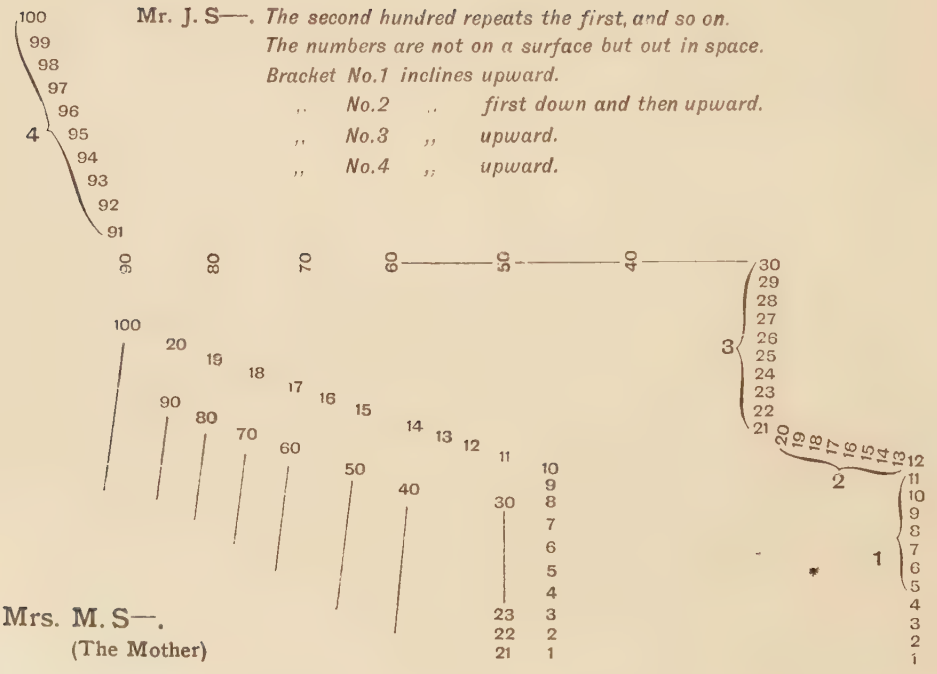
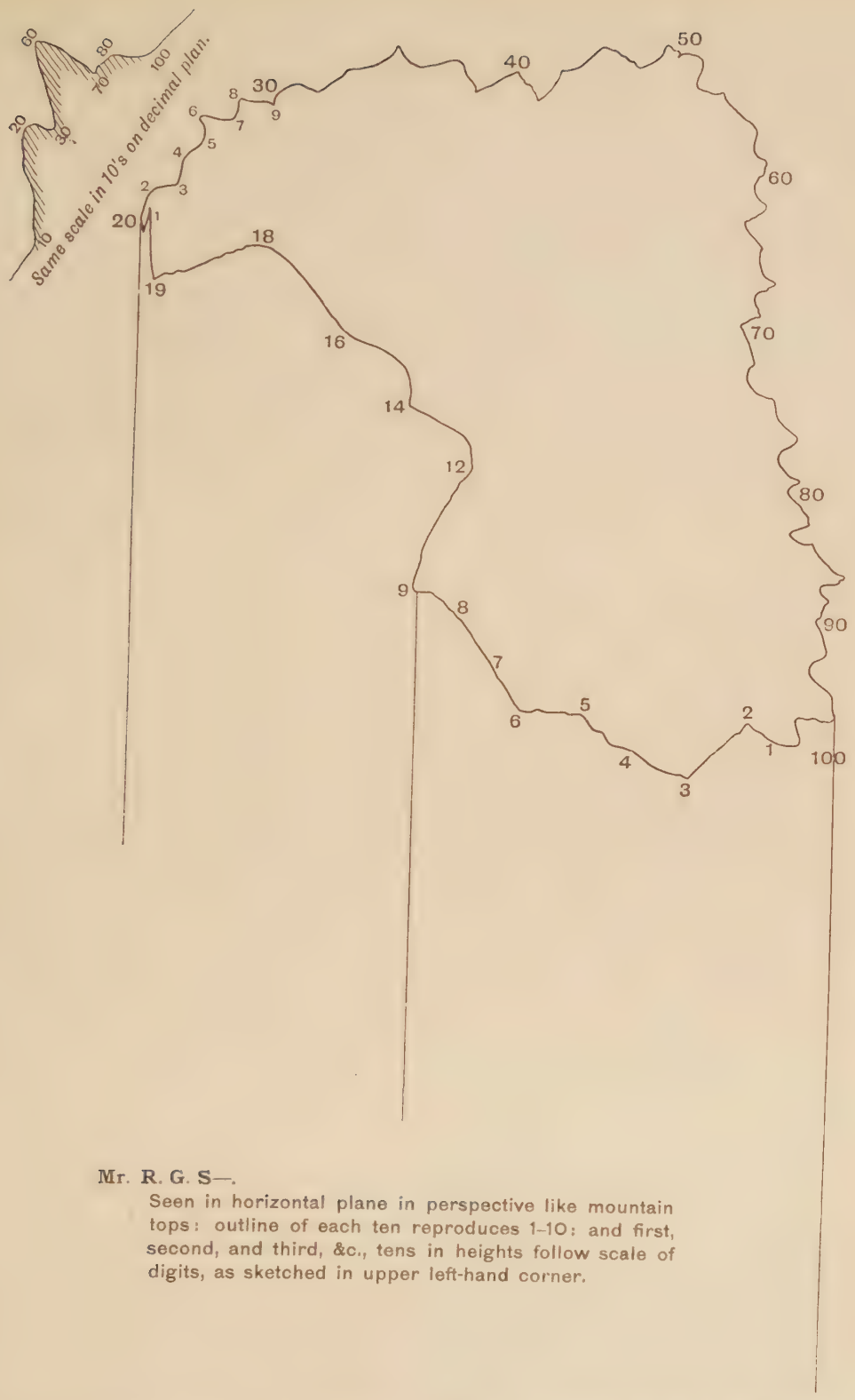

Mr. J. S—. The second hundred repeats the first, and so on.
The numbers are not on a surface but out in space.
Bracket No.1 inclines upward.
,, No.2 ,, first down and then upward.
,, No.3 ,, upward.
,, No.4 ,, upward.
Mrs. M. S—.
(The Mother)

PLATE I (**Synaesthesia**). Number-forms of four members of the S— family (mother and children).



Mr. R. G. S—.

Seen in horizontal plane in perspective like mountain tops: outline of each ten reproduces 1–10: and first, second, and third, &c., tens in heights follow scale of digits, as sketched in upper left-hand corner.

PLATE II (**Synaesthesia**). Number-form of the fifth member of the S— family.

The explanation of synaesthesia varies between the physiological one, which regards a cortical association between different brain centres as the basis of the associated pseudo-sensations; and the psychological one, which regards it as due to an aggressive and persistent association, in part idiosyncratic and dominated in some cases by a community or analogy of emotional tone. Many cases seem to suggest and to support the latter explanation, while little direct proof of the physiological theory seems available, unless the occasional simultaneous appearance of similar synaesthesias in members of the same family be so regarded. There exist, too, allied groups of such unusual but intimate and spontaneous associations, notably in the number-forms and the personification of inanimate objects. (J.J.)

Cases of hereditary synaesthesia, including number-forms, tell strongly in favour of a 'native' or 'constitutional' (called above the 'physiological') theory. The accompanying Plates I and II, selected by the writer from his collection of unpublished cases, show the number-forms of five members of the same family (of nine, not all reported upon), the mother and four children. To the writer (who has another case of three in the same family) this affords strong proof of the hereditary character of synaesthesia, notably in cases in which—as in one of these cases—other peculiarities, such as coloured letters, are also present (cf. a detailed report, with coloured plate, of twenty-one cases of coloured letters, by Colman, in the *Lancet*, January 1, 1898).

The presence of well-defined synaesthesias in young children, who have had neither the sort nor the quantity of experience to establish the requisite associations, is also of weight as against the psychological or 'experience' view. (J.M.B.)

Literature: a good account of cases with literature is to be found in Krohn, Pseudochromaesthesia, in Amer. J. of Psychol., v; see also Calkins, Synaesthesia, ibid., vii; Philips, Number Forms, ibid., viii; Whipple, ibid. xi. Valuable are Flournoy, Les Phénomènes de Synopsie (1893): Bleuler and Lehmann, Zwangsmässige Lichtempfindungen durch Schall (1881); Galton, Inquiries into Human Faculty (1883); Stumpf, Tonpyschologie, i, ii; Morselli, Semej. malat. ment., ii (1895); A. Lemaitre, Aud. colorée et Phénom. connexes chez les Écoliers (1901). (J.J.–E.B.T.)

Synaposematic: see Mimicry (in biology).

Syncategorematic: see Categorematic.

Syncopy (or **-pe**) [Gr. *συγκοπή*, a cutting short]: Ger. *Syncope*; Fr. *syncope*; Ital. *sincope, deliquio*. A more or less sudden loss of consciousness.

It is owing usually to heart failure, and consequent cerebral anaemia. It may be occasioned by cardiac weakness, or loss of blood; but is often due (especially in persons of nervous diathesis) to emotional causes, such as fear, alarm, grief, joy. In a complete syncopal attack there is first a sensation of sinking or giddiness, upon which the patient loses consciousness and falls to the ground. In this state the pulse and respiration are weak and the face pale. Gradually colour returns, slight movements are made, and recovery takes place. Cf. Shock, and Prostration. (J.J.)

Syncretism [Gr. *σύν* + *κρητίζειν*, probably to combine or unite]: Ger. *Synkretismus*; Fr. *syncrétisme*; Ital. *sincretismo*. (1) The attempt to select and combine various elements from a number of philosophic systems without much regard to the intrinsic value o what is selected, or to the logical method of the combination; about the same as eclecticism, but used, upon the whole, in a somewhat more disparaging sense. (J.D.)

(2) In religion: The method of reconciling conflicting principles or interests on the basis of some common ground of interest or belief; abusively, the spirit of indifference or compromise in religion.

In ecclesiastical history the term designates the principles of a party in the Lutheran Church in the 17th century, headed by Calixtus, who laboured to bring about a union of the various branches of the Protestant Church. The attempt was rendered ineffective through persistent opposition, its opponents succeeding in fastening upon its advocates the suspicion of heresy and indifferentism.

Literature: H. Schmid, Gesch. d. synkretischen Streitigkeiten (1846); Gass, Gesch. d. protest. Dogmatik, ii (1850); Schaff-Herzog Cyclopedia, art. Syncretism. (A.T.O.)

Syncryptic: see Mimicry (in biology).

Synderesis (frequently written **Synteresis**, also **Sinteresis**) [Gr. *συντήρησις*]: Ger. *Synderesis*; Fr. *syndérèse*; Ital. *sinderesi*. A technical term of the scholastic philosophy, signifying the innate principle in the moral consciousness of every man, which directs him to good and restrains him from evil.

In the account of the Stoic philosophy given by Diogenes Laertius (VII. i. 85), *τὸ τηρεῖν ἑαυτό*, literally 'taking care of oneself,' or self-preservation, is said to be the fundamental impulse of living beings, which is further described by Chrysippus as harmony with oneself, and the consciousness (*συνείδησις*) of that harmony. But the use of *συντήρησις* as a technical term is first found in the writings of St. Jerome (d. 420). It occurs in one passage only of these writings—the explanation of the 'four living creatures' of the vision of Ezekiel (i. 4–15). Most commentators, he says, hold that the man, the lion, and the ox of the vision represent the rational, the irascible, and the appetitive (or concupiscent) parts of the soul, according to Plato's division, while the fourth figure, that of the eagle, represents a fourth part of the soul, above and outside these three: 'this the Greeks call *συντήρησις*, which spark of conscience (scintilla conscientiae) was not extinguished from the breast of Adam when he was driven from Paradise; through it, when overcome by pleasures or by anger, or even, as sometimes, deceived by a similitude of reason, we feel that we sin; . . . and this, in the Scriptures, is sometimes called spirit' (Rom. viii. 26; 1 Cor. ii. 11; 1 Thess. v. 23). 'And yet we perceive that the conscience (conscientia) is itself also thrown aside and driven from its place by some who have no shame or modesty in their faults.' In this passage no distinction seems to be drawn between *συντήρησις* and conscientia. It has even been maintained (F. Nitzsch, in *Jahrb. f. protest. Theol.*, iii. 492 ff.; *Zeitsch. f. Kirchengesch.*, XVII. i. 23 ff.) that the former word is a copyist's error for *συνείδησις*, the usual Greek equivalent of conscientia. For this supposition there is no sufficient evidence; still less can Ziegler's suggestion of *τονθόρισις* (*Gesch. d. christl. Eth.*, 314) be accepted. The view of Albertus Magnus that the word is derived from *σύν* and *αἵρεσις* is absurd.

The use of synderesis as distinct from conscientia among the scholastics, and to a slight extent among early Protestant moralists, is founded upon its description by Jerome as scintilla conscientiae—the spark (as the phrase would require to be interpreted) from which the light of conscience arises. Thus Jeremy Taylor calls it 'the spark or fire put into the heart of man,' while *συνείδησις*, which is specifically called conscience of the deed done, is the 'bringing fuel to this fire' (*Ductor Dubitantium*, I. i. 1). As distinguished from synderesis, conscientia is applied by these writers to the particular attitude of a man to good or evil action, and may accordingly be an unsafe guide.

Synderesis is thus a faculty or habit (it was disputed which) both of judging and of willing the right, in agreement with 'original righteousness,' and persisting in the separate powers of the soul in spite of the corruption of man's nature brought about by the Fall. In the earlier descriptions it is spoken of as volitional as well as intellectual. According to Aquinas, however, it is distinctly practical reason—certain principles belonging to the practical side of reason which point out the right direction for action, just as the theoretical axioms of the understanding do for thinking; and both synderesis and conscientia are placed among the intellectual powers. A different view is given by Bonaventura, who makes the whole distinction between conscientia and synderesis rest upon the distinction between judgment and will. God (he says) has implanted a double rule of right in man's nature: one for judging rightly, and this is the rectitude of conscience; another for right volition, and this is the rectitude of synderesis, whose function is to dissuade from evil and stimulate to good, and which may therefore be described as the original moral tendency of the disposition.

This, however, does not seem to be either the best or the most prevalent view of scholasticism regarding synderesis (although Ziegler is of a contrary opinion—*Gesch. d. christl. Eth.*, 312). The question is fully discussed by Duns Scotus, who decided against Bonaventura that both synderesis and conscience belong to (practical) reason, the former giving the first principles or major premises of its practical syllogisms, the latter corresponding to their conclusions (*In Sent. Reportationes*, Lib. II, dist. 39, Q. 1–2). Jeremy Taylor (loc. cit.) also follows the Thomistic usage, and makes *συντήρησις* 'the general repository of moral principles or measures.' This is the 'rule of conscience,' while conscience itself is 'a conjunction of the universal practical law with the particular moral action.' It applies the rule to the particular case, and is thus both witness and judge of moral actions.

It may be noted that the term conscience, when used (as by Kant) as equivalent to practical reason regarded as infallible, corresponds to the mediaeval synderesis and not to the mediaeval conscientia.

Literature: Gass, Lehre vom Gewissen

(1869), 216 ff.; and Gesch. d. christl. Eth., § 122; Ziegler, Gesch. d. christl. Eth. (2nd ed.), chap. v; Sidgwick, Hist. of Eth. (3rd ed.), 145; Siebeck, in Arch. f. Gesch. d. Philos., x. 521 ff. The derivation of the term is discussed in the Athenaeum (London) for 1877, i. 738, 798, iii. 16, 48. (W.R.S.)

Synechism [Gr. *συνεχής*, continuous, holding together, from *σύν* + *ἔχειν*, to hold]: not in use in the other languages. That tendency of philosophical thought which insists upon the idea of continuity as of prime importance in philosophy, and in particular, upon the necessity of hypotheses involving true continuity.

A true Continuum (q. v.) is something whose possibilities of determination no multitude of individuals can exhaust. Thus, no collection of points placed upon a truly continuous line can fill the line so as to leave no room for others, although that collection had a point for every value towards which numbers endlessly continued into the decimal places could approximate; nor if it contained a point for every possible permutation of all such values. It would be in the general spirit of synechism to hold that time ought to be supposed truly continuous in that sense. The term was suggested and used by C. S. Peirce in the *Monist*, ii. 534 (July, 1892). Cf. Pragmatism, passim.

The general motive is to avoid the hypothesis that this or that is inexplicable. For the synechist maintains that the only possible justification for so much as entertaining a hypothesis, is that it affords an explanation of the phenomena. Now, to suppose a thing inexplicable is not only to fail to explain it, and so to make an unjustifiable hypothesis, but much worse—it is to set up a barrier across the road of science, and to forbid all attempt to understand the phenomenon.

To be sure, the synechist cannot deny that there is an element of the inexplicable and ultimate, because it is directly forced upon him; nor does he abstain from generalizing from this experience. True generality is, in fact, nothing but a rudimentary form of true continuity. Continuity is nothing but perfect generality of a law of relationship.

It would, therefore, be most contrary to his own principle for the synechist not to generalize from that which experience forces upon him, especially since it is only so far as facts can be generalized that they can be understood; and the very reality, in his way of looking at the matter, is nothing else than the way in which facts must ultimately come to be understood. There would be a contradiction here, if this ultimacy were looked upon as something to be absolutely realized; but the synechist cannot consistently so regard it. Synechism is not an ultimate and absolute metaphysical doctrine; it is a regulative principle of logic, prescribing what sort of hypotheses are fit to be entertained and examined. The synechist, for example, would never be satisfied with the hypothesis that matter is composed of atoms, all spherical and exactly alike. If this is the only hypothesis that the mathematicians are as yet in condition to handle, it may be supposed that it may have features of resemblance with the truth. But neither the eternity of the atoms nor their precise resemblance is, in the synechist's view, an element of the hypothesis that is even admissible hypothetically. For that would be to attempt to explain the phenomena by means of an absolute inexplicability. In like manner, it is not a hypothesis fit to be entertained that any given law is absolutely accurate. It is not, upon synechist principles, a question to be asked, whether the three angles of a triangle amount precisely to two right angles, but only whether the sum is greater or less. So the synechist will not believe that some things are conscious and some unconscious, unless by consciousness be meant a certain grade of feeling. He will rather ask what are the circumstances which raise this grade; nor will he consider that a chemical formula for protoplasm would be a sufficient answer. In short, synechism amounts to the principle that inexplicabilities are not to be considered as possible explanations; that whatever is supposed to be ultimate is supposed to be inexplicable; that continuity is the absence of ultimate parts in that which is divisible; and that the form under which alone anything can be understood is the form of generality, which is the same thing as continuity. (C.S.P.)

Synergism (in theology) [Gr. *σύν* + *ἔργον*, work]: Ger. *Synergismus*; Fr. *synergisme*; Ital. *sinergismo*. The theory which has found many forms of expression in the history of Christian doctrine, that in the regeneration of man there is a co-operation of the human will with the divine grace in such a way as to secure man's free initiative and responsibility for his own salvation.

For a special sense see Monergism and the controversy which it involves.

Literature: see Monergism, Pelagianism, and Jansenism. (A.T.O.)

Synergy: Ger. *Synergie*; Fr. *synergie*; Ital. *sinergia*. The union of partial or lesser motor processes or movements in a whole, giving a larger process or movement.

The term is applied especially to the motor functions of the brain, which unite in innervating a group of muscles; but it is also sometimes used for the muscles themselves, which are thus correlated in a single function or group of functions.

The theory which holds that mental synthesis and unity are due to the union of motor processes has been called the synergy theory (see James, *Psychol. Rev.*, ii, March, 1895, 105 ff.). (J.M.B.)

Synkatathesis [Gr. *συνκατάθεσις*, acceptance]. A Stoic term signifying the assent to or endorsement of a presentation as true.

The theory was very near to the modern view of judgment, which makes it an act of accepting or endorsing a presentation. See Eisler, *Wörterb. d. philos. Begriffe*, 'Beifall,' 'Synkatathesis,' for citations. (J.M.B.)

Synopsia: see SYNAESTHESIA ('Synopsie').

Syntechnic: see MIMICRY (in biology), CONVERGENCE (in biology), and cf. RESEMBLANCE (table).

Synthesis [Gr. *σύν* + *τιθέναι*, to set]: Ger. *Synthese*; Fr. *synthèse*; Ital. *sintesi*. The method, process, and function of putting things together, with the results; the opposite of analysis. See the various topics SYNTHESIS, and SYNTHETIC. (J.M.B.)

In education: synthesis applies to the subject-matter itself, as in chemistry, or to the logical processes involved, or more generally and vaguely to the chief direction of the mental activity. Thus, in illustration of the last, Ziller called the presentation of new matter in a lesson a 'synthetic' step, since the mind in apperceiving unites the new to the old; it 'synthesizes' present and former experiences. For similar reasons he called preparation an 'analytic' step, since the contents of the child's mind are analysed so that the ideas most needful for appreciating the new lesson shall be in the foreground of consciousness. See ANALYSIS, PREPARATION, PRESENTATION, FORMAL STEPS, and METHOD (in education).

Literature: BAIN, Educ. as a Science, 129–31; HERBART, Sci. of Educ. (trans. by Felkin), 154–69; ROSENKRANZ, Philos. of Educ., 101–6. (C.De G.)

Synthesis (chemical): see CHEMICAL SYNTHESIS.

Synthesis (mental or psychic): Ger. *psychische Synthese*; Fr. *synthèse mentale* (or *psychique*); Ital. *sintesi mentale* (or *psichica*). (1) A mental combination in which the composing elements are not separately distinguishable; opposed to INTEGRATION (q.v., in psychology, 1).

The idea of synthesis has assumed great importance in view of the growing tendency to substitute some such principle for the law of association of ideas in many cases in which the latter has proved inadequate. Synthesis views take many forms, as in the theories of APPERCEPTION, ASSIMILATION, SYNERGY, and mental ACTIVITY (see those terms). (J.M.B., G.F.S.)

(2) That unification or combination of the contents of presentation whereby they become qualifications of the same objective whole. Cf. INTEGRATION (in psychology, 2).

Thus the correlation of the data of different senses in the perception of a single material thing is a synthesis (1). Similarly, the comparison of different colour sensations so as to form a single qualitative series is a synthesis (2) at a higher level. At a yet higher level, we have the synthesis which Newton effected by his discovery of the law of gravitation. (G.F.S., J.M.B.)

Synthesis (of Apprehension, &c., Kant): see APPREHENSION, ad fin. Kant distinguishes between 'mathematical' and 'dynamical' synthesis (*Critique of Pure Reason*). (J.M.B.)

Synthetic (-al): Ger. *synthetisch*; Fr. *synthétique*; Ital. *sintetico*. Having or producing the unity of a SYNTHESIS (q.v.).

Synthetic(-al) argument, inference, reasoning, &c. An argument whose conclusion expresses a fact the being of which is given in the being of the premises, so that the conclusion could not be false as long as the premise is true, is analytical; any other mode of argument is synthetical.

A synthetical argument may be a fallacy. In that case, it may be so absurd as not to be an argument in any other sense than that it professes to be so. But if it is an argument (as commonly happens) the real argument is either inductive or presumptive in its nature, these being the two types of synthetic argumentation.

Synthetic judgment: see ANALYTIC AND SYNTHETIC JUDGMENT, KANT'S TERMINOLOGY (Glossary, 'synthetische Urtheile'), HEGEL'S TERMINOLOGY (Dialectic, III, IV), SYNTHETIC PHILOSOPHY, and SYNTHESIS (different topics).

Synthetic method (in logic). What is commonly, very confusedly, meant by a synthetic method is a progressive deductive method,

more or less of the nature of reasoning in *Barbara*.

The confusion between analysis and synthesis is so great (cf. ANALYTIC AND SYNTHETIC JUDGMENT), and the distinction is founded upon such false views of logic, that it is perhaps best to abandon the words altogether in logic. (C.S.P.)

Synthetic Philosophy (the): Ger. *die synthetische Philosophie*; Fr. *la philosophie synthétique*; Ital. *la filosofia sintetica*. The title of the series of treatises by Herbert Spencer, in which his philosophical system is built up as a 'unification of knowledge' drawn from various sciences. See the topics cited under SPENCERIANISM. (J.M.B.)

System [Gr. *σύν* + *στῆναι*, to be set up, to stand up]: Ger. *System*; Fr. *système*; Ital. *sistema*. The term system is employed to designate a whole from the standpoint of the methodic connection and arrangement of its constituent members.

It differs from such terms as aggregate, collection, and inventory, in expressly connoting the orderly inherent bonds which bind together, from the standpoint of rational apprehension and explanation, the parts of the whole. It differs from such terms as organism, totality, and whole, in expressly connoting that it is from the standpoint of *thought*, of mental *method*, that the parts are interdependent. It differs, however, from 'classification' in implying that the mental method has been successfully applied to, and as it were worked over into, the facts; it does not remain outside of them as a merely mental scheme. A system arises whenever a particular plan, a working hypothesis, or scientific method has been so consistently, extensively, and deductively applied to the interpretation and arrangement of a body of facts as to give them internal intellectual coherence and unity, and obvious external detachment or distinction from other facts. This meaning will be found to apply to such apparently diverse uses as the solar system, the post-office system, the system of Platonic philosophy, the system of Shakespearian dramas. The term is more nearly allied to 'organization' than to any of its congeners, all of which agree with it in connoting some kind of whole made up of parts. Cf. AGGREGATE, CLASSIFICATION, COLLECTIVE, ORGANISM, UNIT, and WHOLE AND PARTS. (J.D.)

System (in education). A term used by Herbart to designate the organization of knowledge into a system; hence a stage in method, namely, that of 'generalization.' See FORMAL STEPS, and METHOD (in education).

Literature: HERBART, Sci. of Educ. (Eng. trans.), 126; REIN, Outline of Pedagogics (Eng. trans.), 135. (C.DE G.)

System (mental). The mental life considered as a progressive organization of parts or elements in a SYSTEM (q. v.). Cf. SYNTHESIS (mental), SELECTIVE THINKING, and SELECTION. (J.M.B.)

Systematic Determination (of thought): see SELECTIVE THINKING, RELATIVE SUGGESTION, and SELECTION (in psychology).

Systematic Theology: Ger. *systematische Theologie*; Fr. *théologie systématique*; Ital. *teologia sistematica*. That department of general THEOLOGY (q. v.) which treats of the system of religious doctrine and its organization into a logically coherent discipline; more especially, the system of the doctrines of the Christian religion.

The whole body of theology is ordinarily treated in four divisions: exegetical, historical, systematic, and practical. Systematic theology is either dogmatic or speculative, and includes such topics as the following: (1) theology proper (doctrine of God); (2) anthropology; (3) christology; (4) pneumatology; (5) soteriology; (6) ecclesiology; (7) eschatology.

Literature: see THEOLOGY. (A.T.O.)

T

Tabes [Lat. *tabere*, to waste away]: Ger. *Tabes*; Fr. *tabes*; Ital. *tabe*. Usually equivalent to tabes dorsalis, a disease of the spinal cord, described under Ataxia (locomotor), which constitutes its characteristic symptom. (J.J.)

Taboo [Polynesian *tabu*, marked thoroughly, sacred]: Ger. *Tabu*; Fr. *tabou*; Ital. *tabù*. A sacred or religious prohibition which was best developed in Polynesia, but which in various forms and stages may be traced elsewhere.

The prohibitions of taboo refer both to actions and words or names. The prohibition may be general or applicable to all of a class of articles, or particular as applicable to special individuals alone. It may be permanent or temporary, affect both men and women, or women alone. It may be created by command of a king, or priest, or other official, or it might receive its sanction from tradition and custom. A few miscellaneous illustrations may be cited. In Hawaii the flesh of hogs, fowls, turtle, &c., in the Marquesas Islands human flesh, was tabooed for women. In these islands the houses may be tabooed from the use of water in them; a path may be tabooed and no one walk in it; an island may be tabooed and no one visit it; all of which may last for a definite number of days, or be permanent. If the name of a king of Tahiti was the same as, or resembled, a common word, a new name was substituted; while instances of words which it was unlawful to pronounce are most common. In this way, by modifying the use of names and substituting one for the other, the taboo has had a linguistic influence. As taboos affecting special persons (termed taboos of privilege), may be cited the fact that if in Tahiti the king or queen entered a house it became taboo; the ground they trod on became taboo, and they were frequently carried on men's shoulders to prevent this. Many taboos were of natural rather than conventional origin; thus the exclusion of persons who were ill, of mothers after child-birth, of those who had to do with the dead, or were engaged in warfare, had obvious utility and plausibility. The punishment for violation of the taboo was both civil and religious; the transgressor might lose all his property, or he might be entered by a spirit and succumb to disease. There were elaborate ceremonies for removing the taboo.

Examples of taboo in historical religions may be found among the Jews, Greeks, Romans, and in superstitions of to-day. Among the Jews, the vow of the Nazarite (Num. vi. 1–21), some of the observances of the Sabbath (Exod. xxxv. 2, 3; xvi. 23, 29), the restrictions as to what was cleanly in man and beast, the avoidance of the sacred name of God; among the Greeks, the sacredness of certain animals and persons; among the Romans, the flamen dialis, the sacred priest who was forbidden to touch a horse, to look at an army, to touch or name a goat or dog, to walk under an ivy, &c.

The origin of the taboo is to be looked for in the animistic conceptions of primitive religion, while in its later developments it acquires a civil significance, and thereby aids the conception of property rights and marriage ties. In its earliest stages it is a general religious prohibition which develops into the prohibition of the unclean on the one side, and of the sacred on the other. On the

taboo ' were grafted the golden fruits of law and morality, while the parent stem dwindled into the sour crabs and empty husks of popular superstition ' (Frazer).

Literature: Frazer, art. Taboo, in Encyc. Brit. (9th ed.), from which the above illustrations are derived, and the fuller literature there cited; Jevons, Introd. to the Hist. of Religion (1896). (J.J.)

Tabula rasa [Lat. *tabula*, tablet, *rasa*, empty]: used also in the other languages. The waxed tablet used by the Romans for writing purposes; used metaphorically to characterize the soul prior to sense-experience; employed to denote the theory of the empiricists, according to which all knowledge is imprinted by objects on a passive blank mind.

Plato used the metaphor of a waxed tablet, κήρινον ἐκμαγεῖον (*Theaet.*, 191), in discussing images of memory. Aristotle (*De Anima*, iii. 4) used a metaphor of a piece of writing paper to express the relation of potential to actual reason. This was erroneously used (as by Leibnitz) to make him the author of the *tabula rasa* theory. This was really first stated by the Stoics. Descartes used the phrase, but only ironically and incidentally. Leibnitz, in criticizing Locke's *Essay upon Human Understanding*, uses the phrase continually and technically, and from him it gained general currency as a summary view of the empirical theory (*New Essays*, Introduction). Locke himself does not use the phrase, though he speaks of the mind as a piece of white paper (loc. cit., Bk. II. chap. i. § 2), and employs constantly the metaphor of ' imprinting ' sensations upon the mind. (J.D.)

Tachygenesis. See Regression.

Tactile Illusions: see Illusions of Motion and Movement, I.

Tactile or **Tactual Sensation**: see Touch Sensation.

Taine, Hippolyte Adolphe. (1828–93.) Born at Vouziers, Ardennes, France, he was educated at the Collège Bourbon and the École Normale of Paris. Became a teacher, but soon abandoned the profession, devoting his attention to literature. In 1864 he became professor of aesthetics at the School of Fine Arts, Paris, and member of the Academy, 1878. He made contributions to empirical psychology in his book *L'Intelligence*.

Talbot-Plateau Law: Ger. *Talbot-Plateau'sches Gesetz*; Fr. *loi de Talbot-Plateau*; Ital. *legge di Talbot-Plateau*. If the rate of rotation of a disk bearing alternate sectors of different brightness or colour be sufficiently great to produce a uniform sensation, that sensation is the same as what would be felt if all the light reflected from the several sectors were evenly distributed over the whole disk.

The departures from this law have always been found to fall within the mean error of observations, but when that error was from 5 per cent. to 8 per cent., the law could not be said to have been absolutely confirmed. Lummer and Brodhun have now, however, reduced this mean error to 2 per cent., and they find the departures to fall well within that limit, hence the law may be considered to be rigorously established. A disk with alternate sectors cut out, if interposed in the path of a beam of light, forms a means of diminishing its intensity by a measured amount; it is the best means that we have, since it is exact, it is easily combined with any apparatus, can be introduced anywhere in the course of the light-rays, does not change the character of the light, so that it is not necessary to attend to conditions of polarization nor of greater or less homogeneity (as in changing the width of a slit), and diminishes all light-rays equally and in accordance with a simple law. For sectors of less than 25° in breadth, however, diffraction from the edges interferes with correct results. Lummer and Brodhun have devised a very exact apparatus by which the size of the sectors can be continuously varied during rotation. This sectored disk (Episkotister) was first used for photometric purposes by Aubert.

The Talbot-Plateau law is probably a particular case of the general chemical law of the action of light: if light of intensity a, acting during the time t, produces a chemical action of intensity i, then light of intensity $\frac{a}{n}$, acting during the time nt, produces the same chemical action i. (C.L.F.)

Talmud [Lat. *Talmud*, Chal. *talmud*, instruction, scholar]: Ger. *Talmud*; Fr. *Talmud*; Ital. *Talmud*. The book which contains the Jewish traditions as distinguished from their original Scriptures. It embraces (1) the original traditions ascribed to Moses, and (2) the commentaries and glosses of the later Jewish rabbins.

The Talmud is divided into two parts, the Mishna and the Gemara; the former containing the original traditions, the latter commentaries and glosses on these. The Gemara, to which the name Talmud is sometimes exclusively applied, is divided into two parts, the Jerusalemistic and the Babylonian, the

latter of which is much larger and of greater authority among the Jews than the former.

Literature: see articles in Schaff-Herzog's and McClintock and Strong's Cyclopedias; J. McCaul, Old Paths (1846); Lowe, The Mishna, on which the Palestinian Talmud rests (1882); Levy, Wörterbuch (1875). (A.T.O.)

Tambour (of Marey): see Laboratory and Apparatus, II (general).

Taoism: see Oriental Philosophy (China).

Tariff: see Protection.

Taste: see Taste Sensations.

Taste (aesthetic) [Lat. *taxare*, to touch sharply]: Ger. *Geschmack*; Fr. *goût*; Ital. *gusto*. The faculty of critical and appreciatory discernment of, and judgment upon, objects of aesthetic experience.

Often used as synonymous with 'good taste.' Employed also in an objective way, e.g. a building in good taste.

Taste has been generally recognized by aestheticians as involving at least two distinguishable elements: (1) native sensibility and delicacy of feeling—what may be called aesthetic temperament; (2) culture of the aesthetic judgment by actual exercise and discipline. Such discipline leads to the developed taste of the connoisseur. Taste is in the aesthetic life essentially what character is in the moral life. The question whether there can be any universal standard of taste has been much discussed. Writers of the associationist school (e. g. Jeffrey) have generally denied any real universality for such a standard, because of the multifold nature of the sources of beauty. Hume falls back on the consensus of cultivated opinion. Grant Allen, under biological influences, admits only such consensus as springs from similarity of nervous organization. Writers under idealistic influences have ordinarily defended a contrary view, because of the asserted universality of beauty (e. g. Lotze).

Literature: Burke, The Sublime and Beautiful (2nd. ed. 1757); Begg, The Devel. of Taste (1887); Fechner, Vorschule d. Aesth. (1876). (J.R.A.)

Taste (physiology of). Action of soluble substances within the mouth, producing Taste Sensations (q. v.).

The terminal organ for taste sensations is the taste-bud, a group of modified epithelial cells among which ramify the end-brushes of the taste-nerves. These are, for the posterior third of the tongue, the ixth or glossopharyngeal, and for the anterior two-thirds of the tongue, the lingual branch of the vth and, to some extent, the chorda tympani. The evidence indicates (Oehrwall) that each primary taste sensation is specific for a particular nerve-fibre.

Literature: Tuckerman, in Howell and Kastle's Studies from the Biol. Lab. of Johns Hopkins Univ. (1887), iv. 13; Oehrwall, Skand. Arch. f. Physiol. (1890), ii. 1. (C.F.H.)

Taste (or **Gustatory) Sensations** (or simply tastes): Ger. *Geschmacksempfindungen*; Fr. *sensations de goût* (or *gustatives*), *saveurs*; Ital. *sensazioni gustative, sapori*. The sensations aroused by stimulation of the end-organs of taste. Cf. Taste (physiology of).

There are four gustatory qualities or fundamental tastes: sweet, bitter, acid, salt. Phenomena of contrast, complementarism, and mixture have recently been observed among these qualities. Taste is hardly ever dissociated, in actual life, from smell; and many perceptions are consequently accredited to taste which are in reality olfactory in composition. Tastes are reproduced in kind with relative difficulty, and play but a small part in the higher mental life.

Literature: von Vintschgau, Hermann's Handb. d. Physiol., iii. 2; Wundt, Physiol. Psychol. (4th ed.), i. 438; Kiesow, Philos. Stud., x, xii; Sanford, Course in Exper. Psychol., expts. 52–6; E. Gley, art. Gustation, in Dict. encyc. des Sci. méd. de Déchambre; Titchener, Lab. Manual (1901), chap. iv. Modern literature may be said to begin with Horn, Ueber den Geschmackssinn des Menschen (1825); Sulzer's electrical experiment (1752)—the application of two different metals to the tongue; see Hist. de l'Acad. des Sci. et Belles-Lettres de Berlin, 1754, 356—also deserves mention. See also under Taste (physiology of). (E.B.T.)

Tatian. Lived in the 2nd century A.D. An Assyrian or Syrian, he received a Greek education. Wandered about the Roman empire as a 'sophist,' being dissatisfied with all philosophies and religions; reached Rome 150 A.D. Embraced Christianity, and returned to Greece to teach and write on religious themes. Came again to Rome and became intimate with Justin, whom he greatly revered. Justin's death (166) left him alone, and the numerous Gnostic elements in his system exposed him to censure by the Roman Church, which he left about 172 A.D. He moved to Mesopotamia in the latter part of his life. The place and date of his death are unknown. See Patristic Philosophy (4).

Tauler, Johann. (cir. 1290–1361.) Entered the Dominican Monastery at Strassburg, his birth-place, about 1318, where Meister Eckhart was professor of theology. Studied also in the Dominican College in Cologne, and possibly in St. James's College, Paris. Returned to Strassburg, whence the town council in 1339 banished the Dominicans. Went to Basel, where he became intimate with the 'Friends of God' (a mystical fellowship). Returned to Strassburg, probably 1346, and remained at his post when the Black Death visited that city.

Taurellus, Nicolaus. (1547–1606.) Born in Würtemberg, his real name being probably Oechslein. Educated at Tübingen in theology, he subsequently studied medicine and taught on that subject at Basel. He was one of the first philosophers to oppose the traditional Aristotelian philosophy, aiming to bring philosophy into accord with the theology of the Reformation. See Smith, *Nicolaus Taurellus* (1860 and 1864).

Tautology [Gr. *ταὐτό*, the same, + *λόγος*, speech]: Ger. *Tautologie*; Fr. *tautologie*; Ital. *tautologia*. A useless repetition; a diallelon. A real diallelon destroys a definition, but a merely verbal one does not. (C.S.P.)

Taxation [Lat. *taxatio*, from *taxare*, to rate]: Ger. *Besteuerung*; Fr. *système d'impôts*; Ital. *tassazione*. A system of fixed and compulsory contribution levied to meet the general expenses of the government, whether national or local.

Taxes are distinguished from assessments and fees in being a contribution for general services instead of a more or less adequate return for special services. They are distinguished from fines and confiscations in being part of a regular system, publicly arranged as a means of meeting a deficit which the government account or budget would otherwise show.

There are two main theories of the equity of taxation: (1) equality of sacrifice; (2) minimum of aggregate sacrifice. If either theory were carried out to ideal perfection, the result would probably be very near the other. But in practice, and with the limitations of human character, the pursuit of the first aim results in conspicuous failure to reach either of the two; while the pursuit of the second tends to secure a fair measure of both results. (A.T.H.)

Taxonomic: see VARIATION (in biology), passim.

Taxonomy [Gr. *τάξις*, orderly arrangement, + *νόμος*, a law]: Ger. *Taxonomie*; Fr. *taxonomie*; Ital. *tassonomia*. The laws and principles of the classifying of natural objects; that department of science which treats of classification. See CLASSIFICATION (in biology). (C.S.M.)

Tegmentum [Lat. *tegmentum* or *tegumentum*, a cover]: Ger. (1) *Haut*, (2) *Haubenfeld*; Fr. (1) *tégument*, (2) *étage supérieur du pédoncule*; Ital. (1) *integumento*; (2) *piano superiore*. (1) The outer covering of bodies; the skin. See CUTANEOUS SENSATION, passim.

(2) In neurology: the dorsal portion of the cerebral peduncles or covering of the crura cerebri. (C.F.H.)

Telegony [Gr. *τέλος*, result, + *γένος*, production]: Ger. *Telegonie*; Fr. *télégonie*; Ital. *telegonia*. The supposed effect, on the progeny, of the previous crossing of the female parent with another male, shown by the transmission of certain characters of the first male to the offspring of the second.

Telegony is popularly believed in, and called 'infection of the germ.' No convincing evidence has yet been discovered in favour of this alleged transmission. On the other hand, it must be owned that the known cases of XENIA (q.v.) in plants give some support to the view that the body of the female parent may be in some way affected by the sperm of the male, and it is conceivable that the development of the germ-cells might thus be influenced. [Recent experiments of Ewart, 'President's address,' Sect. Zool., Brit. Ass., *Nature*, Sept. 12, 1901, are entirely negation.—J.M.B.]

Literature: CH. DARWIN, Animals and Plants under Domestication; A. WEISMANN, The Germ-Plasm (1893); J. C. EWART, The Penycuik Exper. (1899); and as cited above. (E.S.G.)

Teleological Argument [Gr. *τέλος*, an end]: Ger. *teleologischer Beweis*; Fr. *argument téléologique*; Ital. *argomento teleologico*. That theistic argument which proceeds on the principle of finality and which reasons from the rational constitution of the world to the necessity that it should be grounded in a purposive intelligence. It is also called the 'design argument.' See TELEOLOGY, and cf. THEISM and (final) CAUSE.

The germ of teleology was involved in Anaxagoras' assertion that *νοῦς* or reason is the prius of the world. The thought was developed by Socrates in a somewhat empirical fashion. It was more speculatively treated by Plato under the idea of the good, while

Aristotle's practical identification of efficacy and finality renders his reasoning both cosmological and teleological. In modern times the English thinkers of the 17th and 18th centuries develop the argument on its empirical side, which calls forth the criticism of Hume and Kant. The Kantian criticism marks an epoch in the history of the argument, forcing it to become speculatively more profound, while on the empirical side it has been influenced by the doctrine of evolution, which has forced it to enter on a new and, in many respects, more fruitful phase.

Literature: see THEISM; HUME, Dialogues on Nat. Religion; KANT, Critique of Pure Reason; STERLING, Philos. and Theol.; FLINT, Theism and Anti-Theistic Theories; PHYSICUS, Candid Exam. of Theism. (A.T.O.)

Teleology: Ger. *Teleologie*; Fr. *téléologie*; Ital. *teleologia*. The word teleology covers the whole range of inquiry supposed to have a bearing on the doctrine that things exist because they ought, or for some purpose. Thus (*a*) the word properly denotes that branch of philosophical study which deals with 'ends' or 'final causes' as real principles of explanation; (*b*) it is perhaps more commonly used to denote the theory that everything has a final cause; and (*c*) it is also used to denote that property of things which consists in their relation to final causes. Further definition, then, must chiefly consist in the definition of 'end' or 'final cause.'

'End,' in the sense in which it defines teleology, must mean (1) something which is good in itself, and not merely as a means. Where 'end' means nothing but this, it may be conveniently distinguished by the name 'ethical end.' Teleology, then, can only be spoken of where ethical ends are supposed to be real principles of explanation. But by this supposition is meant (2) the doctrine that some things exist, because either they themselves or other things, to which they are means, are good. If, therefore, a good thing or ethical end is merely a cause in the proper sense of the word (see CAUSE), it is not said to be a final cause. For (3) the production of the effect is not then said to be due to the *goodness* of the ethical end, but to the prior existence of the good qualities which it possesses. It is only where a thing is supposed to produce an effect *because it is good* that it is said to be the final cause of that effect; and only so can the explanation of the effect by reference to it be said to be teleological. And further (4), where a good thing is a cause merely in the ordinary sense, its effects often neither resemble it themselves nor are means to the existence of other effects resembling it, even in respect of goodness. But the effect of a final cause is always supposed to be either some good thing resembling it, or a means to the existence of some such good thing. These four conditions, then, namely, that the 'end' referred to must be (1) an ethical end, (2) a cause of the existence of something, (3) a cause in virtue of its goodness, (4) a cause of effects resembling it, constitute the indispensable minimum of meaning with which the word 'teleology' can properly be used.

But since conditions (3) and (4) can most easily be supposed to be fulfilled, where the ethical end is the object of some existing desire, we get a second notion, which is commonly included in the notion of teleology—the notion of what may be conveniently called a 'psychological end.' A 'psychological end' denotes any object which is desired, i.e. an object of which an existent mind is in some way aware, or of which the idea is present to it, and causes desire. Such an object may be something which already exists, but is not necessarily so; and even where an existent object is spoken of as an end in the psychological sense, it would generally be admitted on reflection that this use of the term is improper, and that the true 'end' is some effect of the object in question on something else—an effect which does not already exist. E.g. though a fruit which actually hangs on the tree may be a real object of desire, and may be spoken of as a psychological end, it would be generally admitted that the real end, in this case, is some kind of possession of the fruit—a possession which is not actual at the moment of desire, and the existence of which will commonly cause that particular desire to cease. [This distinction is sometimes characterized by the phrases 'world of fact' and 'world of desire.'—J.M.B.]

Teleology, then, commonly includes in its notion of 'end,' not only the 'ethical,' but also the 'psychological' end. Its 'final cause' generally means a good thing, which does not already exist but is already desired. It is only where an ethical end is thus also an object of desire, that its goodness, and not merely its good qualities or the end itself, can be easily supposed to produce effects at all, and that these effects can be supposed to resemble it. We are indeed commonly said sometimes to desire a thing 'because of its

goodness,' and it is a partial analysis of this popular conception which has led to the philosophical doctrine of final causes—that the goodness of things causes desire for them, and hence also causes that realization of them, which is effected by desire. The analysis is, however, only partial, since it has two defects. (1) It has always failed to distinguish between the goodness of a thing and the thing itself, or those qualities of it which are good. Thus, whereas the thing itself is commonly called the 'end' or 'final cause,' it is yet supposed that its effects are produced only because it is good, i.e. that its goodness is the cause of those effects. (2) It also fails to distinguish the object of desire from the idea of that object, which idea actually exists in the mind at the moment of desire, and may be said either to constitute a part of the complex fact called 'a desire,' or to be a cause of that desire. This idea is certainly part cause of the effects which desire brings about, and it is chiefly because it is not distinguished from its object that a 'psychological end' was ever supposed to be a cause at all, and the notion of 'final cause' ever conceived. Thus the idea itself is often spoken of as if it were the psychological end or final cause; and, even where the object of the idea is meant, that object is credited with the efficiency which belongs to the idea—an ascription which could only be defended on the ground of the philosophical theory, now generally given up, that the object of an idea is the cause of that idea's existence, and hence also of its effects.

Thus, where the 'end,' to which teleology refers us as a cause of existence, is supposed to be not only an 'ethical' but also a 'psychological' end, the word is commonly used as if it combined by definition the characters which belong (*a*) to a good object of desire, (*b*) to the goodness of that object, (*c*) to the idea of it, (*d*) to the idea of its goodness. Two further meanings are added to these when, as is often the case, the psychological end is held to be a sufficient mark of the 'end' of teleology; for we then get (*e*) object of desire, (*f*) idea of such object, as characteristics of a final cause from which the other four may be inferred. Since, however, it is difficult to maintain that every object of desire is *ipso facto* a good object, various methods are commonly adopted for reconciling meanings (*e*) and (*f*) with the first four. One common method is to say that the object of desire is always something which the person desiring it thinks to be good, even if it is not really so. This method gives us four more meanings of final cause, all of which are often confused with one another and with the first six: (*g*) what is thought to be good, (*h*) its supposed goodness, (*i*) the idea of it, (*j*) the idea of its goodness. Another method of maintaining the identity of psychological and ethical ends is to say that all desire is directed to what is good, if not actually, at least 'fundamentally,' or 'really,' or 'by nature,' or 'in general.' This method again gives four new meanings to the 'end' of teleology, for each phrase used; and these four are also commonly confounded both with one another and with our first six. They are (*k*) the object of a 'fundamental' desire, (*l*) the goodness of that object, (*m*) the idea of it, (*n*) the idea of its goodness. We thus get fourteen possible ways of defining the 'end' which teleology declares to be a cause, each of which is emphasized by different philosophers or by the same philosopher, at different times, according as each belongs obviously to some object of which it is desired also to assert any of the other meanings.

The 'teleological' explanation of a thing, then, most usually denotes a discussion of it in which any or all of the fourteen notions above enumerated are confused with one another, provided only that (*a*) and (*b*) are among the number, and that the object, to which any one of them is applied, is supposed to be a cause of effects resembling itself. In this way the four minimum conditions for a proper application of the word 'teleology' are fulfilled, and at the same time a much fuller meaning is given to the term.

Attempts might be made to eliminate some of these sources of ambiguity and to give a clear and consistent meaning to 'teleology' as follows:—

(1) The supposition that, in order to produce its effects, an 'ethical end' must be also a 'psychological end' might be rigorously excluded. An 'ethical end,' as such, might be arbitrarily assumed to be the cause of everything resembling it; but, since it is eternally what it is, it would have to be supposed that it produced its effects at all times equally, and hence it could not be used in explanation of any differences between one state of the world and another, and the hypothesis might not admit the possibility of progress. It would also have to be arbitrarily decided whether (*a*), the ethical end itself, or (*b*), its goodness, was to be regarded as final cause; and the former alternative

would leave no reason for ascribing causal powers to it rather than to what is bad.

(2) Final cause might be defined as 'good psychological end,' and the 'idea' of such an end might be definitely excluded from the term. This definition would suffer from the same arbitrariness as the former, both in the ascription of causal powers to such an entity at all, and in the limitation of these powers to *good* objects of desire. It would further be impossible to regard such a final cause as sole cause of its effects; since, being defined as an object of desire, it could only be supposed to act when it also happened to be desired, i.e. the existence of a desire would be a necessary condition for the existence of its effects. It would only be this desire, and not the final cause itself, which could account for progress.

(3) The term 'final cause' might be definitely limited to the *idea* of good objects. It would then become obvious that a final cause denoted only one particular class of things which are causes in the ordinary sense, and not a different kind of cause. But, since good and bad ideas act in the same manner, the adoption of a particular name for the causation of the former only would be perfectly useless; whereas, on the other hand, causation by ideas, whether good, bad, or indifferent, is a process sufficiently different from other cases of efficient causation to be usefully denoted by a special name. Hence—

(4) The phrase 'teleological explanation' might be usefully employed, as modern psychology tends to employ it, to cover all cases where desire is assigned as a cause. But it would have then to be understood that 'final cause' denoted only one class of objects which are efficient causes; and that the historical connection of the term with 'ethical ends' was utterly abandoned.

Since Kant, the word 'teleology' has been frequently connected with a theory in which the word 'end' seems to be used in an even looser sense than any of the above. In all the above senses 'ends' and 'means' were distinguished, in that the 'means' denoted anything which was an efficient cause of the existence of something resembling or approximating to the end, and which was itself supposed to be produced by the final causation of the end; and thus the means might be regarded as both cause and effect of the end. In the modern theory, there is little attempt to distinguish in what sense, if any, the end is cause of the means, and hence 'end' seems mainly to denote any good effect, and 'means' the cause of that effect. At the same time, however, it is maintained that an end has to its means a closer relation than is constituted by the mere fact that it is an effect of the latter. This closer relation is said to be observable in living bodies, where it is stated that all the parts are both means and ends to one another, and also all means to the whole. And any whole of which the parts are supposed to bear this relation to itself and to one another is called an 'organic' or 'teleological' unity. In what precisely this relation consists is not exactly defined; but it may be noted: (1) That, in order thus to regard two parts of an organism as means to one another, it is necessary to extend the meaning of the word 'means,' from a cause prior in time to its effect, to anything of which the existence is supposed to be a necessary condition of the existence of something else, even though both exist simultaneously. (2) That the relation, over and above this 'mechanical' relation, which ends and means are supposed to bear to one another, seems to be conceived as one which will entitle you to identify the means with the end, saying that the existence of the end is not only necessary to the existence of the means, but that the latter would not be what it is unless the end existed. Thus a 'teleological' relation is supposed to be a relation which alters the things it relates, so that it is not they, but some two other things which are related. And 'end' would seem to be defined as denoting either that one of two such things which (*a*) is not altered by the relation, but gives the other a likeness to itself, (*b*) is the better of the two; or the whole formed by two things which have this relation, which whole is generally supposed to be better than either separately and than other things, owing to the mere fact that it is constituted by such a relation. Those who suppose the world to constitute such a whole, often speak of the property thus belonging to it as 'the immanent teleology of nature,' as opposed to the 'teleology of outward design,' wherein the means is merely an efficient cause of the existence of the end. Cf. ORIGIN *versus* NATURE, passim.

History. The Greeks and Romans had no word corresponding to teleology, though it is from the Greek word τέλος, 'end,' that the name is derived. For a history of 'final cause' see CAUSE. It is only necessary here to add: (1) that Anaxagoras gave an impulse to Plato's teleology by his doctrine that the orderliness

of the universe was caused by the purpose of νοῦς to produce it; (2) that Aristotle does at different times ascribe to his τέλος all the fourteen different meanings above enumerated, often using the term φύσις to denote the 'reality' as opposed to the mere existence of a desire; and that his ultimate final cause is regarded by him as something which exists from the beginning and causes all change in the universe by the desire of all things to approximate to it, an approximation which he perhaps thought was always equally realized. In modern philosophy the terms 'end' and 'teleology' have generally superseded 'final cause,' and hence a fuller history is appropriate here than was given under CAUSE.

The form in which teleology first makes a prominent appearance is in connection with theology. The Christian doctrine that many, if not all, events are caused by God's will as means to the future existence of perfection had persisted through the Middle Ages, along with the Aristotelian conception of final causes; and the two were explicitly combined by Leibnitz (see CAUSE). But the exclusive prominence given to mechanical causation by the scientific successes of the Renaissance extruded in general the Aristotelian conception, whereas it could be easily combined with the Christian doctrine. Teleology, then, was chiefly used to mean the doctrine that God's will set the machine of nature going, for the sake of the good and beautiful things which it produces, and especially for the present benefit and ultimate perfection of man. Kant was chiefly instrumental in dismissing from philosophy this conception of teleology, by maintaining that we could not argue from the existence of good things to the fact that they had been designed by any one. He held, however, that there was in things an element which could not be explained by mechanical causes alone—an element which he called 'adaptation to ends' (Zweckmässigkeit). This element he discovered in three chief instances: (1) in the beautiful, (2) in living organisms, (3) in the fact that the world is such that we can know it. In these cases he seems to have thought that certain things, which were necessary conditions to one another's existence and to the whole which they formed, might also be said to exist (in some undefined sense) for the sake of the harmonious result produced by their coexistence; and that the whole, which they composed, changed their nature, so that their existence, as having that nature, might be said to be caused by the existence of the whole. He thus gave rise to the last sense of teleology above defined. At the same time it is to be noticed that in his *Ethics* he uses 'end' in all the Aristotelian senses, and that he maintains a close connection between the moral end and that of nature. 'Teleology' still continues to have the very wide and vague significance thus given to it, as something higher than, or even contradictory to, mechanism; but the connection of this conception with that of psychological activity is now more generally emphasized than it was by Kant. The marked progress of biological studies in this century has also tended to revive the conceptions of Aristotle; the word 'end' being used, even by writers who do not speak of teleology, to denote a good or useful effect of organic changes, and frequently with an implication that the changes occur for the sake of this effect. (G.E.M.)

A broad view of history discloses certain types of teleological theory: (1) the teleology of deism, the view that there is a mind outside of nature creating or directing nature with a view to certain ends. On this view nature, apart from such direction, is a mechanical system. (2) The teleology of immanent theism, which finds in nature itself, either in part or whole, a strain of intelligence. Nature realizes ends which are intelligent or good over and above, or in opposition to, the results in which a strictly mechanical system would issue. (3) The view that the universe can be understood only as itself being a form of intelligence or reason, of which the mechanical is a partial exhibition, but of which only its character as end-realizing is the complete meaning. Of these three views we may say: to the first, intelligence interferes with mechanism; to the second, it denies or transcends mechanism; to the third, it interprets and completes the system of which mechanism is a partial expression. These three views are illustrated in history, first, by the teleology of the design argument (Paley); second, by that of the ontological arguments (Lotze); and third, by that of the identity philosophy (Schelling) and the various forms of absolute idealism (Hegel).

The evolution of the conception, reflected in the shades of meaning of the term, is accordingly that of the philosophy of theism. A progressive reinterpretation of nature has taken place, in which the claims of monistic idealism have made themselves felt. The current definition of teleology is therefore that of a world theory which does not exclude

mechanism, but in some way includes and reinterprets it.

Moreover differences emerge in construing the nature of the intelligence, reason, or thought, which is found in nature: so we have VOLUNTARISM (q. v.), INTELLECTUALISM (q. v.), SPIRITUALISM (q. v.), each maintaining a form of teleology. The essential problem to them all is that of showing how mechanical principles as formulated by physical science may yet be the vehicle of the realization of ends. The sort of discussion which arises in this field—about the principles of science—is illustrated in the remarks on natural selection and teleology under HEREDITY (q. v.).

A distinction is made under AUTOTELIC (q. v.) between that term and 'heterotelic.' These terms may be used to characterize the forms of teleology distinguished immediately above: to the deist the world process is heterotelic; to the immanent theist it vibrates between the two according to his emphasis; to the thoroughgoing monistic idealist it is autotelic. This gives to the world process in an absolute sense a character which is attributed in a relative sense to various functions and processes (e. g. art-creation). The parts of such a whole as the world whole, may be heterotelic when considered with reference to the whole; that is, as contributing to an end implicit in a whole itself perhaps autotelic. Or the reverse may hold: functions themselves autotelic may nevertheless, by realizing their ends, come into relation to a whole which is capable only of a heterotelic construction (as, for example, acts of individual conation found, when taken in large numbers, to illustrate the law of probability). Cf. MORAL STATISTICS, and see HEREDITY. (J.M.B.)

Literature: KANT, Krit. d. Urtheilskraft; SIGWART, Logik; the literature of RELIGION (philosophy of, q. v.), THEISM (q. v.), and general works on metaphysics. See also BIBLIOG. B, 2, *k*. (G.E.M.–J.M.B.)

Telepathy [Gr. τῆλε, at a distance, + *παθεῖν*, to experience]: Ger. *Telepathie*; Fr. *télépathie*; Ital. *telepatia*. Communication between mind and mind otherwise than through the known channels of the senses.

The term—which was introduced by F. W. H. Myers in 1882, and which is used in the publications of the Society for Psychical Research and elsewhere—has sometimes been limited to such communication between persons at a considerable distance from one another, the word thought-transference being reserved for such communication between persons in the same room; but in practice this limitation is found to be inconvenient, and telepathy is used to include both. The word telaesthesia was suggested by Myers at the same time to express perception otherwise than through the senses, but without reference to a second mind. The term metapsychosis has been suggested to designate mental stata especially of the percipient (see below) under telepathic conditions.

The existence of telepathy is not yet generally admitted by the scientific world, but it has been one of the main functions of the Society for Psychical Research—in this article hereafter called S.P.R.—to obtain and investigate evidence on the subject.

The evidence is of two kinds. There are, firstly, experimental cases, where one person—the 'agent'—tries deliberately to convey an idea or impression to another—the 'percipient'—who may, or may not, be endeavouring to receive a communication at the time; and secondly, spontaneous cases, where communication occurs unexpectedly and unsought by either of the persons concerned.

Spontaneous occurrences prima facie telepathic have from time to time been noted in all ages and countries; and, in connection with hypnosis, experimental transference of ideas and sensations apparently otherwise than by the senses has been occasionally recorded during more than a century by French, German, and English observers. But it is only recently that these phenomena have been systematically investigated or their possible importance as evidence of telepathy recognized; and it is to W. F. Barrett that credit is due for first drawing public attention to this in a paper read before the British Association for the Advancement of Science in 1876. Experimental results in telepathy have, during the last quarter of a century, been obtained by a number of observers, and range from the transference of sensations and ideas between persons in the same room, to the production by the agent of apparitions of himself to a percipient in another house.

The older observers in mesmerism had observed in some cases 'community of sensation' between the patient and his hypnotizer, the former appearing to taste what the latter put into his mouth, or to feel pricks or pinches inflicted on the latter. Malcolm Guthrie, of Liverpool, succeeded in obtaining the same results with percipients in a normal state—unhypnotized—and the experiments

have also been repeated, by Gurney, with hypnotized percipients (see *Proc. Soc. Psych. Res.*, ii. 3–5, 17–19, 205).

More numerous attempts have been made, and by a greater number of experimenters, to transfer visual images of colour or form—whether of numbers, of diagrams and simple drawings, of playing-cards, or of ordinary objects—looked at by the agents. Many examples will be found in the *Proc. S.P.R.* and in the *Proc. Amer. S.P.R.* We may specially refer as specimens to experiments by Sidgwick and others, vi. 128–70; Guthrie and others, ii. 24–42; Lodge, ii. 189–200; Dessoir iv. 111–26. And a considerable amount of success has attended these attempts, both with percipients in a hypnotic and those in a normal state.

On the whole hypnosis seems to be a favourable condition for percipience. Though in these experiments the agent has often adopted the plan of actually experiencing the sensation—e.g. looking at a number—there is little reason for supposing that this is important, or that it serves any purpose other than fixing the agent's attention. Indeed, when the thing to be transferred is a visual image, it often happens that the idea is correctly apprehended by the percipient with no exact perception of the form. On the other hand, nameless forms have been transferred, and in some cases the form of an object or of a drawing has been reproduced by the percipient without any perception of its meaning. Experiments have been made in the transference of subjects mentally pictured by the agent and developed as hallucinatory pictures by the hypnotized percipient, which show interesting variations in the way in which the percipient's mind works on the transmitted idea (*Proc. Soc. Psych. Res.*, viii. 552–77). Cf. similar experiments (not telepathic) with verbally suggested ideas (*Proc. Soc. Psych. Res.*, viii. 459–63).

Another type of experiment is for the agent mentally to suggest actions to the percipient. With this may be classed cases in which a transmitted idea emerges through table-tilting or automatic writing. A valuable series of experiments of this latter class was carried out by P. H. and Mrs. Newnham (*Proc. Soc. Psych. Res.*, iii. 6–23), in which Mr. Newnham wrote down questions unseen by Mrs. Newnham, whose hand automatically wrote relevant answers, the purport of which she was unaware till she read them. For experiments in telepathic impressions expressed through table-tilting see especially a series conducted by Charles Richet (*Rev. Philos.*, Dec. 1884, and *Proc. Soc. Psych. Res.*, ii. 247 ff.). In these cases the telepathic impact appears to express itself in action before it reaches the normal consciousness of the percipient. It may similarly sometimes be made to reach his normal consciousness through a visual or auditory hallucination, as in the experiments above referred to.

A form of experiment of some theoretical interest is the production telepathically of local anaesthesia—the making of, say, a selected finger rigid and insensible by purely mental suggestion. Here we have a mental suggestion not only reaching the percipient subconsciously, but producing an effect which it is not within his power to produce by voluntary effort. An experiment of this kind requires of course a specially suggestible percipient, and arrangements must be made to prevent his receiving through his senses any hint as to the special finger to be operated on (see *Proc. Soc. Psych. Res.*, viii. 577 ff., and i. 257, ii. 201, iii. 453, v. 14). Analogous to this is the production of hypnotic sleep at a distance, as recorded by Gibert and Pierre Janet and other French experimenters (*Rev. Philos.*, Feb. and Apr. 1886, Sept. 1888; *Rev. d. l'Hypnot.*, Feb. 1888; also *Proc. Soc. Psych. Res.*, iv. 133, v. 43).

Finally, under the head of experimental telepathy must be mentioned a small number of successful attempts by the experimenters to cause apparitions of themselves to a friend in another house or room (see *Phantasms of the Living*, i. 103–9, lxxxi–iv; *Proc. Soc. Psych. Res.*, x. 270–7). These are of special interest on account of their analogy with cases of spontaneous telepathy to be mentioned presently.

In experimenting in telepathy the sources of error to be guarded against—apart, of course, from wilful deception—are of three kinds. First, the agent may unconsciously give indications by word, look, gesture, variations of breathing or of muscular pressure, &c., which may reach the percipient through his senses and be unconsciously interpreted by him. With hypnotized percipients especially, it is, moreover, necessary to take account of the possibility of hyperaesthesia or abnormal acuteness of the senses. Variations of muscular pressure are so difficult to guard against when agent and percipient are in contact, as in the so-called willing game, that it is seldom possible to attach importance to results

obtained under these circumstances. Apart from contact, the possibilities of indications through the senses in some kinds of experiments are very subtle, and require constant watchfulness and attention. Hansen and Lehmann, of Copenhagen, for instance, found that in experiments in transferring numbers they were liable, unless they directed their attention to avoiding it, to whisper the number thought of, so that the sound could, under suitable conditions, be heard by the percipient, and this although the agent's lips were closed and not visibly moving (*Philos. Stud.*, xi. 4). On this basis they criticized the conclusions drawn from the series of experiments in transferring numbers, published in the *Proc. Soc. Psych. Res.*, vi. 128 ff. Their results in guessing numbers intentionally whispered with closed lips were repeated and confirmed by H. Sidgwick; but their inference that this particular source of error vitiated the experiments referred to was shown to be ill founded (*Proc. Soc. Psych. Res.*, xii. 298–315; see also *Science*, May, 1899).

Secondly, in estimating results care must be taken to note how far habit or association or external suggestion may at any given time suggest the same idea independently to agent and percipient. For instance, most persons, when asked to name numbers at random, have a tendency to name some more often than others; so that, unless the agent avoids all selection, by some such device as drawing numbers out of a bag without seeing them, there is a danger that a coincidence of 'number-habit' between him and the percipient may produce a fictitious semblance of thought-transference (see paper on the 'Number-Habit' by C. S. Minot, *Proc. Amer. S.P.R.*, 86). The effect of 'diagram-habit' has also been investigated by Minot (*Proc. Amer. S.P.R.*, 302 ff.) and by G. Le M. Taylor (*Proc. S.P.R.*, vi. 398).

A third danger to be avoided is that of overestimating the resemblance between the impressions of the agent and of the percipient (see Hansen and Lehmann, loc. cit.). This cannot of course occur where the attempt is made to transfer an idea so definite as a playing-card or a number; but with less simple ideas, or with nameless forms, resemblance may be striking without being exact, and care must be taken not to allow bias to operate in estimating the degree of correspondence. In these latter experiments, too, the probability of success by chance in any one experiment cannot usually be calculated—an important consideration, since in a series of telepathic experiments it is seldom found that even the majority of the percipient's impressions are correct. Thus in the whole series of 644 trials with numbers of two digits to which reference has already been made (*Proc. Soc. Psych. Res.*, vi. 128), only 117 were completely successful. As, however, the probability of a single guess being right by chance was known to be 1 in 81, it can be shown that the result obtained proves a causal connection between the number drawn and the percipient's impression. Such arithmetical proof is not possible in the case of diagrams and simple drawings made at the moment—a form of experiment which, however, for other reasons offers considerable advantage.

Turning now to spontaneous telepathy, instances of what there is prima facie good ground to regard as such may be found corresponding to most of the forms of experimental telepathy already mentioned. Trivial experiences, however, such as those of which the bulk of the experimental evidence consists, can seldom afford strong evidence of telepathy when occurring unsought; and therefore, as regards spontaneous telepathy, the interest centres in cases where a striking subjective experience of an unusual kind—such as a sensory hallucination—corresponds in a marked way with some crisis in the life of the supposed agent. Such an occurrence is the seeing of an apparition of a friend at the time of his death. For a sensory, and especially a visual hallucination, such as the apparition of a friend in a part of space actually unoccupied by anything resembling a human being, is not a very common experience with persons in good health; most persons go through life without it, and with those who have an experience of this kind it is often unique. If it occurs, therefore, at the time of the death of that friend, the presumption of a causal connection between the two is prima facie strong; and the analogy of experiment, and especially of the occasional—though it must be admitted rare—production of an apparition of the agent as a result of an attempt to communicate telepathically, suggests that that causal connection is telepathic. It is convenient to distinguish hallucinations thus causally connected with an external event as 'veridical' or truth-telling. It must be remembered, however, that the great majority of hallucinations, even of those experienced by sane persons, are not veridical, so that the proof that appa-

rently veridical ones coincide with the external event otherwise than by accident depends on the proportion of their number to the whole number of apparitions being greater than can reasonably be explained by chance.

A discussion of apparitions from the point of view of telepathy, by Gurney, Myers, and Podmore, was published, under the name of *Phantasms of the Living*, in 1886. Further discussion and evidence will be found in the 'Report of the Census of Hallucinations' (*Proc. Soc. Psych. Res.*, x. 25 ff.), the authors of which conclude that the evidence strongly supports a telepathic explanation of the coincidences[1].

In discussing telepathy reference must be made to the alleged instances of the detailed perception of scenes, places, and events unknown in any normal manner to the percipient, but known to some human mind, though there is no agent either trying to transfer the impression or going through any special crisis. The evidence for this faculty, sometimes called 'clairvoyance' or *telaesthesia*, though inferior to that far more simple telepathy, is still sufficient to call for recognition.

The percipients in these cases have usually been in a hypnotic or similar trance state, though sometimes such visions occur through crystal vision or otherwise to persons fully awake. The scene described is sometimes within the knowledge of persons in the room, and sometimes, if telepathically learnt, could only be learnt from persons at a distance. The perception is sometimes of past scenes, sometimes of things existing or happening at the moment, and sometimes relates to intentions rather than facts. (See *Proc. S.P.R.* vii. 30–99, 199–220, 356–69, 370–3; viii. 405–11; also Andrew Lang, *The Making of Religion*, chap. v.)

The reasons for supposing that such knowledge is acquired telepathically rather than by direct perception of any kind unmediated by another mind, are: (1) that in some cases the mind of a person present is the most obvious source of information, e.g. when a scene is described in which a person present took part the day before; and (2) that, if on other grounds we admit telepathy as a *vera causa*, we must obviously assume for it as wide a scope as possible before attributing other unknown powers to the human mind.

While briefly indicating some of the more important lines on which evidence for telepathy has been sought, little has so far been said as to the nature of the process or the conditions under which it may occur. As a matter of fact, but little progress has been made towards any theory or explanation. If the telepathic faculty exists at all, we should expect to find at least traces of it in most of us, and experiment has to some extent confirmed this (see Richet in *Rev. Philos.* for Dec., 1884, 'La Suggestion mentale et le Calcul des Probabilités'; also *Phantasms of the Living*, i. 33 ff.). But one thing that seems certain is that some persons are more capable than others of receiving or of transmitting ideas telepathically. There is, moreover, some reason for thinking that a good percipient is likely to be also a good agent.

Even with the best agents and percipients who have yet experimented, however, success cannot be depended on. One day almost every attempt to transmit an impression may succeed, and the next the percipients may either have no impressions at all or wholly incorrect ones. Even in consecutive periods of time and with no discoverable change of conditions success will vary. Under these circumstances it is of course difficult to draw theoretical conclusions of any value from failure under conditions intentionally varied. It is not surprising, therefore, that even so fundamental a question as whether the process is a physical or a purely mental one cannot be answered with certainty.

The possibility that telepathic transmission is effected by vibration in the ether has been more than once suggested, and notably by Sir William Crookes in his presidential address to the British Association for the Advancement of Science in 1898; and in support of this hypothesis may be urged the fact that in experiments, distance seems to increase the difficulty of transmission. But, on the other hand, the effect of distance has not been observed to vary according to any law; and—since part of the telepathic process is undoubtedly mental, and psychological causes, such as preconceived ideas, influence the results—it is quite possible that the difficulty introduced by distance may not be physical at all, but purely psychological. And we have

[1] The conclusions of the report were controverted by Edmund Parish in two brochures entitled *Über die Trugwahrnehmung* and *Zur Kritik des telepathischen Beweismaterials* (1894 and 1897), which were combined in an English translation published in the Contemporary Science Series under the name of *Hallucinations and Illusions*. A reply to Parish appeared in the form of a review in *Proc. Soc. Psych. Res.*, xiii. 589. [This work by Parish is considered one of the ablest negative criticisms of telepathy, especially as bringing out the psychological factors involved.—J.M.B.]

an argument against a physical explanation of telepathy in the spontaneous cases, since, so far as the evidence enables us to judge, it here operates independently of distance. An apparition of a dying friend is apparently as likely to occur when he is in the Antipodes as when he is in the next room. But the evidence is perhaps hardly sufficient to justify even a tentative generalization. Light could of course be thrown on the question if we could ascertain whether time is occupied in telepathic transmission, and, if so, measure it.

Even supposing, however, that the time occupied were appreciable, the difficulty of measuring it would seem almost insuperable, since we do not know how to ascertain which is the moment of the effective action of the agent, nor which is the moment of the telepathic receipt of the message by the percipient. The former may be indefinitely later than the first inception of the idea, and the latter may precede the emergence into consciousness, remaining latent for an unknown interval.

To sum up, there is a body of evidence of various kinds for the existence of telepathy which cannot be ignored; but, as yet, little has been done towards discovering the nature of the process or the conditions under which it occurs, and there is urgent need for further experiment and observation.

Literature: Proc. Soc. Psych. Res. (15 vols., 1882–1901); Proc. Amer. Soc. Psych. Res. (4 Nos., 1885–9); E. Gurney, F. W. H. Myers, and F. Podmore, Phantasms of the Living (1886); L. Marillier, Des Hallucinations télépathiques, traduit et abrégé des Phantasms of the Living (1891); Frank Podmore, Apparitions and Thought-transference (1894); F. C. C. Hansen and Alf. Lehmann, Ueber unwillkürliches Flüstern, Philos. Stud., xi. 4 (1895); Edmund Parish, Zur Krit. d. telepathischen Beweismaterials (1897); and Hallucinations and Illusions (1897); J. Ochorowicz, La Suggestion mentale; R. Osgood Mason, Telepathy and the Subliminal Self (1897); Morselli, I fenomeni telepatici (1898); G. B. Ermacora, La Telepatia (1898). (E.M.S.)

Telesius, Bernhardinus. (1508–88.) Educated at Rome. After 1538 he lived in Rome, devoting himself entirely to the study of natural science until about 1565, when he was called to Naples to teach. He is a forerunner of Bacon and the modern scientific era.

Temper: see Temperament, and Terminology, German, 'Gemüths-.'

Temperament [Lat. *temperamentum*, proportion, from *temperare*, to modify; trans. of Gr. *κρᾶσις*], Ger. *Temperament*; Fr. *tempérament*; Ital. *temperamento*. Characteristic difference in the congenital constitution of individuals, manifested, e.g., by differences in their emotional susceptibilities, in the rapidity of their mental processes, in the fixity of their conations, &c. See Individual Psychology, and cf. Variational Psychology. 'Temper' is used as equivalent to temperament, with especial stress upon emotional and volitional character. (J.J.–J.M.B.)

The traditional classification of temperaments is into the sanguine, melancholic, choleric, and phlegmatic. The sanguine and choleric are supposed to be subject to rapid alternation of interest. With the choleric, interest is intense while it lasts, whereas with the sanguine it is relatively feeble. The interest of the melancholic and of the phlegmatic is persistent when once it is aroused, though they are not easily excited. The interest of the melancholic is intense, whereas that of the phlegmatic is lacking in vividness.

Literature: Henle, Anthropol. Vorträge, Heft 1, 118 f.; Kant, Anthropol.; George, Lehrb. d. Psychol., 136 ff.; Wundt, Phys. Psychol. (4th ed.); Ribot, Psychol. des Sentiments. Cf. Individual Psychology. (J.J.)

Temperance: Ger. *Mässigkeit*; Fr. *tempérance*; Ital. *temperanza*. Moderation and self-control in anything, but especially in indulgence in pleasures. (J.S.–J.M.B.)

Temperance, in the large sense of moderation or self-control (*σωφροσύνη*), was the characteristic Greek virtue. The product alike of political and religious conditions was a deep sense of the duty of obedience to law or observance of the limit, of the excellence of modesty (*αἰδώς*), and of the evil of insolence (*ὕβρις*). The Greek regard for rational order and for the grace of form is at the root of the matter. For Plato temperance is one of the four cardinal virtues, both in the state and in the individual. He describes it as a harmony or agreement between the higher and the lower parts—the governing and the governed in the state, the rational and the appetitive in the soul, resulting in the obedience of the lower to the higher. While Aristotle's specific virtue of temperance is still narrower in its range than Plato's, he may be said, in his doctrine of the 'mean,' to reduce all virtue to the habit of moderation or temperance in the large sense. Christianity reaffirmed the importance of this virtue, deepening and broad-

ening the Greek conception of it. The new emphasis given by Christianity to the negative element in temperance, through its principle 'die to live,' led to the exaggeration of temperance into abstinence, which is, in Aristotle's eyes, an extreme—that of defect—no less than excess. On the difference between Christian and Greek ideas of temperance cf. Green, *Proleg. to Ethics*, Bk. III. chap. v. §§ 261–78. (J.S.)

Temperature Sensation: Ger. *Temperaturempfindung*; Fr. *sensation de température* (or *thermique*); Ital. *sensazione termica* (or *della temperatura*). A sensation of heat or cold.

It is obtained by stimulation of the skin or certain parts of the mucous membrane that takes the place of the skin. These sensations present an analogy to the simple affective qualities of pleasantness and unpleasantness, in that they pass over into one another through a point of INDIFFERENCE (q. v.). Whether Weber's law holds for temperature intensities is still an open question.

Theories of the temperature sense are as yet very incomplete. We have: (1) the assimilation-dissimilation theory of Hering; (2) the adaptation theory of Wundt; (3) the specific energy theory of Goldscheider. It should be noted that an attempt has recently been made to distinguish between the qualities of 'hot' and 'warm.' Cf. TEMPERATURE SPOT.

Literature: WUNDT, Physiol. Psychol. (4th ed.), i. 385, 415; HERING, Hermann's Handb. d. Physiol., iii. 2; SANFORD, Course in Exper. Psychol., expts. 13–20, 25; GOLDSCHEIDER, Du Bois-Reymond's Arch. (1885), 340 ff.; and Pflüger's Arch. (1886); ALRUTZ, in Mind, N.S., vi, vii; TITCHENER, Lab. Manual (1901), chap. iii; VON FREY, Ber. d. math.-phys. Cl. d. k. Sächs. Gesell. d. Wiss. (March 4, 1895); BLIX, Upsala Läkareförenings Förhandlingar (1883); DONALDSON, Mind, O.S., x (1885); KIESOW, Philos. Stud., xi (1885); CRAWFORD, Psychol. Rev., v. (1898) 63 ff. Cf. CUTANEOUS SENSATION, and HAPTICS. (E.B.T.)

Temperature Spot: Ger. *Temperaturpunkt* (*Kältepunkt, Wärmepunkt*); Fr. *point de sensibilité thermique* (*point froid, point chaud*); Ital. *punto di sensibilità al freddo* (*al caldo*), *punti termici*. A spot of the skin, areal rather than punctual, evincing a peculiar sensibility to heat or cold. The PAIN SPOTS (q. v.) are, as a general rule, most thickly distributed; pressure spots less thickly; cold spots still less thickly; heat spots most sparsely. The functional stability of the temperature spots has been questioned. [E.B.T. prefers the terms 'warm-spot' and 'warmth,' to 'heat-spot' and 'heat.'—J.M.B.] (E.B.T.)

Spatial discrimination is less acute by temperature spots than by pressure spots, and less by heat spots than by cold spots. (C.L.F.)

The use of 'spot' rather than 'point' would seem to be justified in view of the questioning of the theory of elementary nerve-elements each acting alone for a single 'point,' not only in this case (Crawford as cited under TEMPERATURE SENSATION), but also in the determination of SENSORY CIRCLES (q. v., Tawney). If points are finally determined within the spots, both terms may remain in use. (J.M.B.)

Literature: WUNDT, Physiol. Psychol. (4th ed.), i. 417 ff.; SINGER, Psychol. Rev., iv. 256; and the literature cited under TEMPERATURE SENSATION. (E.B.T.)

Temporal: see TIME.

Temporal and Eternal [Lat. *temporalis et aeternalis*]: Ger. *zeitlich und ewig*; Fr. *temporel et éternel*; Ital. *temporale ed eterno*. Terms employed to distinguish that which belongs to the order of passing change from that which is unchangeable and enduring, and which is conceived to be more real than the temporal.

The instinct of religion is to seek and rest in the abiding and the immovable. The changeable and temporal aspect of things is a show-world, to use Royce's phrase, which has no reality. Eternal is a term which applies to that which transcends the whole perishable aspect of things, and is therefore applied to that ideal life which satisfies the deepest religious aspirations. (A.T.O.)

Temporal Sign: Ger. *Temporalzeichen* (Lipps); Fr. *signe temporal*; Ital. *segno temporale*. A term coined on the analogy of LOCAL SIGN (q. v.) to indicate the process or attributes of process which determine the temporal relations of ideas, whether to one another or to the subject.

According to Wundt, 'feelings of expectation are the qualitative, and sensations of movement the intensive temporal signs of a temporal idea. The idea itself must then be looked upon as a fusion of the two kinds of temporal signs with each other and with the objective sensations arranged in temporal form' (*Outlines of Psychol.*, Eng. trans. 1897, 156 f.). Cf. Lipps' memory-image theory (*Grundtatsachen des Seelenlebens*, 1883, chap. xxvi) and Münsterberg's theory of muscular strain sensations (*Beitr. z. exper. Psychol.*, ii. 1889, 13). (E.B.T.)

The theory of temporal signs is connected with that of 'genetic nativism' in the larger problem of the cognition of TIME (q. v.; cf. EXTENSION). The signs may not be temporal, but qualitative and intensive. The element of nativism comes in in the synthesis of these signs in the form of time with the arrangement of events in an order of succession. The problem of time-cognition has been developed by Ward (*Encyc. Brit.*, 9th ed., art. Psychology) under the figure of a cross section of consciousness represented by a circle with data of present and past experience (presentations and ideas) distributed in it. The time line passes through the centre at right angles to the plane of the circle. Assuming that the circle is without thickness (that is, that it cuts the line at a point), the problem of time-cognition and of temporal signs may be stated thus: how are the items at present in the circle distributed as before and after on the line which is at right angles to it? The theory of genetic nativism answers: only by some distinctive marks or signs attaching to these items respectively upon which consciousness proceeds in the construction of the time line: these marks are the temporal signs. If, however, we hold that the circle is not without thickness (in other words, that it is a segment itself occupying a time-period), then there is a time-datum, an attribute of 'temporality,' which takes the place of temporal signs, and by successive piecing out, end on end, builds up the time line. The essential of time cognition (i. e. before- and after-ness) is then given in this datum of temporality—what James calls 'the specious present.'

In either case past time is a construction by abstraction from concrete 'pieces' of duration, and future time is a similar construction.

Different temporal signs have been designated by various writers: relative intensity or vividness of presentation or idea (the most intense being nearest to the present); relative grouping of the items in the present, which is interpreted to reconstitute the order of original occurrence; movements of attention (variations in the attention process being signs of the temporal order of the items as originally attended to).

Literature: that of TIME (q. v., different topics). (J.M.B., G.F.S.)

Temporality: no foreign equivalents in use. Suggested to designate the original temporal datum, or time-extent; analogous to EXTENSITY (q. v.) considered as a datum of space-extent: such a datum being, however, in each case in dispute. (J.M.B., G.F.S., C.L.F.)

Temptation [Lat. *tentare*, to try]: Ger. *Versuchung*; Fr. *tentation*; Ital. *tentazione*. Appetence towards that to which a lower, or away from that to which a higher, value is consciously assigned; applied also to the object of the lower appetence in either case. (J.M.B.)

Tendency [Lat. *tendere*, to stretch]: Ger. *Tendenz*; Fr. *tendance*; Ital. *tendenza*. The existence of a tendency is constituted by that state of a being which (1) will issue in a certain process on the removal of inhibiting or interfering conditions, positive or negative; and (2) will maintain its own positive nature in and through the new conditions.

An acorn may be crushed into a shapeless mass, or it may grow into an oak. But we do not speak of it as having a tendency to be crushed into a shapeless mass, whereas we do naturally regard it as having a tendency to grow into an oak. The reason is that we consider it as maintaining its distinctive acorn nature in becoming an oak, but not in being crushed.

The mental fact which we call CONATION (q. v., also on variations in the German equivalents) is a clear instance of tendency in the sense defined. In the process of attaining its end, it is 'realized' or 'fulfilled' instead of being destroyed or suppressed, and it always proceeds to the attainment of its end if, and so far as, other conditions permit. The term tendency may also be appropriately applied to the conative disposition or to dispositional INTEREST (q. v.); for these tend of themselves to issue in actual conations, and do so in the absence of interfering conditions. Cf. the very closely related concept POTENTIALITY.

Literature: LIPPS, Grundtatsachen des Seelenlebens; the literature of CONATION, and WILL. (G.F.S., J.M.B.)

Tendon Sensation: Ger. *Sehnenempfindung*; Fr. *sensation des tendons*; Ital. *sensazione tendinea*. In the perceptions of resistance, of lifted weight, &c., there is involved a sensation of strain, qualitatively distinct from the pressure sensations of skin, joint, and muscle, and from pain. There is an element in the sensation of strain which is probably furnished by the terminal organs of the sensory nerves which run to the tendons, and which is therefore called tendon sensation. Cf. STRAIN SENSATION.

On its intensive side, the tendon sensation has been found to obey Weber's law, thus resembling the sensation of pressure. Cf. HAPTICS, and ORGANIC SENSATION. (E.B.T.)

Literature: KÜLPE, Outlines of Psychol., 142, 162; GOLDSCHEIDER, Du Bois-Reymond's Arch. (1889, 3 arts.); MÜLLER and SCHUMANN, Pflüger's Arch., xlv; BEAUNIS, Les Sensations internes; CLAPARÈDE, Le sens musculaire. (E.B.T.–J.M.B.)

Tenet: see DOGMA.

Tennemann, Wilhelm Gottlieb. (1761–1819.) Born and educated at Erfurt, he became Privat-docent in 1788 at Jena, and lectured on the history of philosophy. He became assistant professor at Jena in 1798. From that time until 1819 he was engaged in writing his history of philosophy in eleven volumes. After 1804 he was professor of philosophy in Marburg, where he died.

Tense: see CONJUGATION (in grammar), and cf. GRAMMAR.

Tension (sensations of): see STRAIN SENSATION.

Tenure (of land) [Lat. *tenere*, to hold]: Ger. *Art der Lehnbarkeit*, (2) *Lehen, Erbbesitz*; Fr. *tenure*; Ital. *possesso della terra*. (1) The right of holding property in land.

(2) The kind of right by which property in land is held.

English tenures are based on the feudal system, under which each proprietor (tenant) held under a feudal superior to whom he owed some feudal service, the ultimate superior being the king. This has become so interwoven with their political constitution, that although the many ancient feudal tenures are now practically reduced to one—that of free and common socage—English courts still treat the heritable qualities of land as not subject to variation in favour of those claiming under foreign adoptions, legitimations, or marriages of a kind not permitted by English law. See Dicey, *Conflict of Laws*, Introd., 32, chap. xxii. Feudalism viewed all land as the fruit of conquest, and its owner as invested with the rights of a conqueror, as to jurisdiction as well as property. Roman law viewed it as acquired by virtue of a civil act of the state —a grant, passing property, but not any sovereignty or jurisdiction. 'At Rome, property was derived from political rights, rather than political rights from property' (Arnold, *Hist. of Rome*, i. 168). The English colonies in America were generally settled under charters specifying that the lands were to be held of the king, as the lord, in free and common socage, as of some specified English manor. *Military tenure* required of the tenant military aids and services, uncertain as to the time of their performance, because dependent on military necessities. *Free socage tenure* required free, honourable, and certain aids or services, not of a military character, or in some cases fealty only; and *free and common socage tenure*, of the king, was a tenure by mere fealty. Colonial practice and legislation soon made land titles there, generally, *allodial*, i.e. an absolute fee simple estate of inheritance, not held of any superior (see Kent, *Commentaries on American Law*, iii. 509). Allodial tenure preceded feudalism on the continent of Europe, and was less absolutely superseded by it there than in England. The French Revolution turned France into a country of small proprietors in fee (see *Code Civil*, Liv. II. tit. ii). *Freehold tenure*: an estate held under no superior for a life or some uncertain period.

Kinship is the first basis of civil society, and when the nomad tribe settles down upon a fixed territory, the land becomes the bond of union, in place of the connection by blood. Land tenures are at first common, then individual. See Maine, *Ancient Law* (103), *Village Communities*, and the *Early Hist. of Inst.* (72, 188).

Literature: BLACKSTONE, Commentaries, ii. chaps. v, vi; LORIA, Analisi della proprietà capitalistica; Systems of Land Tenure in Various Countries, edited for the Cobden Club by J. W. PROBYN; the works cited above. (S.E.B.)

Teratology [Gr. *τέρας*, monster, + *λόγος*, science]: Ger. *Teratologie*; Fr. *tératologie*; Ital. *teratologia*. The science which treats of malformations or monsters.

Under this are included cases of particularly abnormal formations, such as supernumerary members, absence or deficiency of limbs, double monsters (Siamese twins), one creature with two heads, hermaphrodites, acephalic monsters, &c. On the mental side these are of interest as indicating the correlation of abnormal physical with abnormal mental conditions, and as illustrative of the effects of brain deficiency or peculiarity. They fall under VARIATIONAL PSYCHOLOGY (q. v.). In anthropology, mythology, and folk-lore, monsters have always been a subject of speculation and myth. See MONSTER (also for literature), and SPORT. (J.J.)

Term [Lat. *terminus*, trans. of Gr. *ὅρος*, literally a boundary; there is a Greek word

τέρμα, but it is not used in a logical sense]: Ger. *Terminus*; Fr. *terme*; Ital. *termine*. (1) One of the principal parts of a PROPOSITION (q.v.). If from the proposition 'Socrates is mortal' we strike out the separate indication of the subject we have '—— is mortal'; and this ought to be regarded as a term. It is usually stated that 'mortal' is the term; but if there is any difference, it should rather be '—— is mortal.'

In most languages no separate word 'is' is required to assert that 'Socrates is mortal'; and as long as Greek was the language of logic, in which an *is* may be inserted or may be omitted, little importance was attached to the *is*. But the Latin logicians of the 12th century began to regard this as essential, and thus made a distinction between 'is mortal' and 'mortal,' which relates to the peculiarities of a small class of languages. Thereafter logicians, and especially nominalists, began to regard terms no longer as parts of propositions, but as general names having an existence and meaning irrespective of any potential proposition. In most languages there appear not to be any such nouns, or very few. In Semitic languages, for example, common nouns are thought as parts of verbs, approaching the nature of participles, as most of them in fact are. It is, therefore, scarcely more true that they are mere names than that our words 'seeing' and 'dying' or 'moriturus' are names. There is in connection with them the idea of their being fragments of possible propositions; and so much so, that the mere adjunction of two of them makes a proposition.

If, however, we are to take *term* as meaning a word used as the sign of (to *designate*) an independent individual object, then it is proper to notice that there are many other signs of that nature. We may therefore generalize the meaning of 'term,' and define it (in the general sense) as a sign which does not separately indicate its object, and therefore cannot separately determine its interpretant.

The ordinary logics overlook *relative* terms. 'Anything whatever is mother only of things loved by itself' is a proposition beyond dispute, since it is true or false. Therefore it must have a predicate: this is, 'is mother only of things loved by'; or it may be taken to be, 'is mothered only by lovers of'; or, 'loves everything mothered by'; or, 'is either lover of or not mother of'; &c. Relative terms once admitted, it becomes evident that every verb is a term, the difference between 'loves' and 'lover' being merely that the rules of grammar prescribe different syntax for them. On the other hand, there are various words used in propositions which are not terms, because they cannot take the place of proper names. 'Any' may be considered as meaning 'Whatever is,' or 'The individual which the reader selects,' and so as a term; and in like manner 'Some' may be taken as meaning 'The object the wise friend of the speaker selects,' or something of the sort. Relative pronouns, however, together with the letters *A*, *B*, *C*, &c., often used as relative pronouns of an improved kind, if symbols at all, are so extremely like indices that they may for ordinary purposes be so considered.

Abstract terms are matters of extreme importance in all difficult reasoning. Thus, in geometry, we define a *point* as a completely determinate place, an *instant* as a completely determinate time, and a *particle* as that which in any instant is at one point and not at any other. But in a time not completely determined a particle *moves*. We express that by introducing the abstract term *line* as the place in which a particle may be in the course of time. The advantage of doing this is that it enables us to consider relations of lines and their motions, which we could not have done without the abstraction.

(2) A relation is said to have *terms*, which are the objects thus related the one to another. So we speak of the terms of a ratio or proportion.

Absolute term: a term like a common substantive word which connotes nothing.

Ampliate and *ampliative terms*. An *ampliative* term is a term which when in the predicate causes its subject, the *ampliate* term, to denote more than before. Among ampliative terms are reckoned by Scotus (in I *Priorum*, qu. xvi) verbs in future and past tenses, and future and preterite participles; also such verbs as *potest*, *contingit*, and names derived from them; also *significo*, *intelligo*, *promitto*, and the like, and in general every verb whose object may be indifferently a present or future thing.

Concrete term: a term not abstract, whether it be a substantive or purely denotative term (according to the mediaeval doctrine) or an appellative or connotative term.

Connotative term: a term which, in addition to 'supponere pro,' or directly denoting something, also *connotes* that that principally

denoted thing has some essential or accidental aspect. Such is 'white,' which means 'having whiteness.'

Denominative term: a NAME (q. v.).

[*Designate term* (and *designation*): a term which is used to indicate merely a particular object or class of objects; the application of such a term is 'designation.'—J.M.B.]

Discrete term: a term which denotes one sole individual, but this may be an individual collection, or system.

Exponible term: a syncategorematic word making a proposition exponible, that is, exceptive, exclusive, reduplicative, inceptive, comparative, &c. (C.S.P.)

Negative term: any portion of experience (whether complicated or not) can be conceived of as a single term a; *all* of what is *other than* it is then regarded as the negative of that term, and is represented by *non-a* (or by $\bar{a}$). The negative has, therefore, two properties: (2) it fills up the whole of the rest of the field of thought (whether that be absolutely all that is conceivable or merely the immediate subject of discussion), and (1) it is in some essential respect distinct from its positive, so that there can be no object which is at once a and $\bar{a}$; in other words, (1) nothing is both, and (2) everything is one or the other. If, following the grammatical device by which we say *large round table* for a thing which is at once large *and* round *and* a table, we write $a\,b$ for things which are at once a and b, and if we write $a+b$ for things which are a or b; if, moreover, we write o and ∞ for nothing and everything respectively, and $\prec$ for *is*, or *implies*, we may express these two elements of the definition of the negative thus:

$$(1)\ a\bar{a} \prec o, \qquad (2)\ \infty \prec a+\bar{a}.$$

The second is commonly called the principle of *no tertium quid* or of the excluded middle; the first, the principle of contradiction. But a and $\bar{a}$ are called contradictory terms (and in the case of propositions p and $\bar{p}$ are said to exactly *contradict* each another); it is a pity, therefore, to give the name of principle of contradiction to one only of the two conditions which they must satisfy. It would be much better to call (1) the property of exclusion (or mutual exclusion), and (2) the property of exhaustion (or conjoint exhaustion). These two properties of being mutually exclusive and conjointly exhaustive may be possessed by any number of parts of a whole; thus *equal to*, *greater than*, and *less than* exhaust the relation of relative size and exclude each other—they may be regarded as a contradictory triplet. When we abstract from all other properties of objects and think of them simply under the aspect of quantity (that is, in mathematics), we state these two properties at once in the form of a so-called axiom; (3) the whole is equal to the sum of its parts; that is, is not greater than (there is no overlapping) and is not less than (there is no falling short, no unoccupied space, no *tertium quid*) its parts when put together. But as thus stated, this axiom is tautologous; what is the meaning of *its parts*, if not the two properties restated in the axiom? It would be better to substitute for this axiom a postulate: things can be separated up into parts which are *distinct* and *constitutive*, that is, which do not overlap and which together fully make up the whole, or which are *exclusive* and *exhaustive*. And as thus stated the postulate applies to the concepts or terms of logic as well as to the quantities of mathematics.

Every term has a negative unless it fills up the whole universe, in which case its negative is non-existent: $\infty \prec a$ is the same thing as $\bar{a} \prec o$. It can be proved that to a given term there is only one negative (Grassmann; Whitehouse, *Universal Algebra*, i. 36). What is the negative of a term which is itself a negative? It must be *all* of that which is *other than* that negative, but this takes us back to the original positive term, or the relation of 'being a negative of' a term is a reciprocal relation; that is, $\bar{\bar{a}} = a$. This last is, therefore, not, as Sigwart thinks, another axiom, or postulate, but a derived proposition. (C.L.F.)

Terminism and **Terminists**: see OCCAMISTS.

Terminology. [The various sections of this article are supplementary to the terminological matter of the DICTIONARY. The sections are arranged by languages, and in each the terms are in alphabetical order. Cross-references from one of these lists to another always have the word 'above' or 'below' to distinguish them from cross-references to the main topics of the work. In cases in which the recommendation supplements or modifies that made under a leading topic, a cross-reference is made to that topic. The terms included here are indexed in the general Indexes to vol. ii, along with the matter of the DICTIONARY generally, so that the entries in those Indexes suffice for the whole text.—J.M.B.]

I. English.

Affection and **Affective**: see below, German, Gemüths-.

Affective Logic (or **Emotional Logic**). The former of these two terms is preferred—since it is broader—as a designation for the supposed process of abstraction, generalization, and symbolization of affective states. Cf. Revival. (J.M.B., W.M.U., E.B.T.)

Ameliorate: see Meliorism, ad fin. (with foreign equivalents).

Animation: see Animism (meaning 1). Ger. *Beseelung*; Fr. *animation*; Ital. *animazione*.

Critic and **Critique**. Both of these terms are used for Kant's *Kritik*. See Logic, passim.

Emotional Logic: see Affective Logic (above).

Meaning. This word covers, besides the definition given sub verbo, the terms Signification, Intent, Opinion, and Significance (or Worth); see these topics for foreign equivalents. For signification as connotation there is in German Sinn, and also Bedeutung; but the latter covers significance (as in the phrase 'die Bedeutung dieses Ereignisses') as well, when the idea of value or Worth (q. v.) is largely that of consequence (in fact or logic). (J.M.B.)

Misoneism: see below, French, Misonéisme.

Moment: the specious Present (q. v.). It is suggested that this term be devoted to this exact meaning, with the following equivalents: Ger. *Augenblick* (H.M.); Fr. *instant, présent*; Ital. *attimo*—(E.M.). (J.M.B., H.M.)

Pain and Pleasure: see this topic (1) and (2), and also Pleasantness. In view of the great ambiguity of terms in this subject the following scheme of equivalents is suggested:

Pain and pleasure (in general): Ger. *Unlust und Lust*; Fr. *douleur et plaisir*; Ital. *dolore e piacere*.

Pain and pleasure (sensations): Ger. *Schmerz- und Lustempfindung*; Fr. *sensation de douleur et de plaisir*; Ital. *sensazione di dolore e di piacere*.

Unpleasantness and pleasantness: Ger. *Missfallen und Wohlgefallen*; Fr. *peine et agrément*; Ital. *dispiacere e (sentimento di) piacere*. (J.M.B., H.M., Th.F., G.V.)

Significance: see Meaning (above).

Synthetic Form. Proposed rendering of the German Gestaltqualität, as better than Form Quality (q. v.). The proposed French and Italian equivalents are respectively *forme synthétique* and *forma sintetica*. (J.M.B., Th.F., E.M., G.V.)

Will. The following table gives the scheme of terminology recommended, sub verbis, for the various topics under this head (see also the list of terms for conative processes given under Conation).

	Ger.	Fr.	Ital.
Will	*Wille*	*volonté*	*volontà*
Volition	*Wollen*	*volition*	*volizione*
Intention	*Absicht*	*intention*	*intenzione*
Project	*Projekt*	*projet*	*progetto*
End	*Zweck*	*but*[1]	*fine*[1]
Purpose	*Vorsatz*	*fin*	*proposito*
Plan	*Plan*	*plan*	*piano*
Design	*Ziel*	*dessein*	*disegno*
Means	*Mittel*	*moyens*	*mezzi*
Decision	*Entschluss*	*décision*	*decisione*

[1] See End for other equivalents.

A discussion of certain of these German terms with reference to one another is to be found in Höfler, *Psychologie*, 517 f.; on certain of them see also Eucken, *Gesch. d. philos. Terminol.*, Register, 'Deutsche Termini.' (J.M.B., K.G., H.M.)

II. German.

Abscheu: strong aversion, abhorrence (see Appetence). Abscheu is one of the contrasted forms of conation which differ only as tending respectively away from or towards an object. (J.M.B., G.F.S., E.B.T., H.M.)

Allgemein: see under Gesammt- (below).

Anlage: see Rudiment, and Anlage. The recommendation of rudiment as rendering of Anlage is supported by the following considerations: (1) It has an adjective form, rudimentary; this is not true of any of the other terms in use (Proton, Anlage, Fundament). (2) It answers as a general psychological term, as none of the others do; this is important, as the psychologists are as much concerned with the term as are the biologists (cf. the citations of the German use of Anlage by psychologists in Eisler, *Wörterb. d. philos. Begriffe*, 'Anlage'). (3) It is used so widely in French and Italian as to be recommended by the consulting editors in both those languages, each quite independently of the other. This makes it a convenient common term in English, French, and Italian. (4) It is quite unambiguous, provided Vestige (q. v.) be used for the meaning (2) given under Rudiment. (5) Insuperable objections may be urged to the use of each of the other terms

proposed: i. e. against using Anlage—besides what is said under that term—(*a*) no adjective, (*b*) no English plural formation, (*c*) no agreed French and Italian usage; against Proton, the same objections; against Fundament, the first and third objections, and moreover, the adjective form is ambiguous; against Primordium, the second and third.

The neurological authorities (H.H.) of this work sent out a circular asking the opinion of eminent writers as to the best equivalent of Anlage. The following table is taken from an article (*J. of Compar. Neurol.*, vii, Mar. 1898) by C. L. and C. J. Herrick, discussing the results of that inquiry. The American and European preferences, given under each term, are indicated by the letters *Am.* and *Eu.* respectively—

Term.	*Replies.*	*Am.*	*Eu.*
Proton	13	7	6
Anlage	11	8	3
Rudiment	9	5	4
Fundiment	6	3	3

Other terms (scattering).

The writers add: 'The term rudiment was in several instances opposed to vestige, thus removing any possible ambiguity. It is probable that this is the consensus of opinion of those who recommend this term.' This consideration—taken with the actual proportion of votes for the term and the availability of the French and Italian forms—seems to make a conclusive case for it.

The biological authority (C.S.M.), however, thinks the use of the German form Anlage too deeply fixed to be counteracted. Yet it may be noted that its use is mainly by American embryologists. In psychology, various renderings of Anlage have more or less currency: disposition, predisposition, capacity, original endowment, &c. Titchener, who gives disposition, writes (*Amer. J. of Psychol.*, vii. 85): 'None of the words proposed by the morphologists . . . seems to fit the psychology of Anlage. And disposition and predisposition are too vague to be really adequate.' These statements are true, and the term rudiment may accordingly have its place in cases in which a specific mental tendency or endowment is in question. For the functional meaning the adjective 'rudimentary' is available, and also the terms DISPOSITION and PREDISPOSITION as made exact in the definitions given under those topics. For example, we can say that the capacities which reveal themselves in differences of mental type are in their early stages mental rudiments, that they are rudimentary in their character and place in the mental life, and that in their specific exhibitions (in reaction, in preferential function, &c.) they are predispositions (inherited) or dispositions (either inherited or acquired). In German 'Disposition' (see Eisler, loc. cit.) and in French 'disposition' (see Barth, *Philos. d. Gesch. als Sociol.*, i. 28, quoting Comte) are used for mental Anlage.

(J M.B., H.H., E.B.P., G.F.S., E.B.T.)

Anschauung: INTUITION (q. v.). See also WAHRNEHMUNG (below), and INTUITION (German, below). (J.M.B.)

Bahnung: see FACILITATION, which is preferred (following Titchener) to other renderings—such as 'canalization' (Waller), 'path-making' (James)—as available in psychology as well as in neurology. (J.M.B., E.B.T., H.H.)

Bedeutung: see MEANING (above).

Beseelung: see ANIMATION (above), and cf. EINFÜHLUNG (below).

Darstellen: to present, by way of expression, exhibition, or phenomenal appearance; a general, as contrasted with the special, meaning of PRESENTATION (q. v.) in psychology. Leibnitz's monads present or represent (darstellen, représentent) the universe at the same time that they have presentations of (vorstellen) the universe. (With the noun, as in Selbstdarstellung, SELF-EXHIBITION, q. v.) (J.M.B., K.G., E.B.T.)

Dressur and Eindrillung: training or breaking-in of the type called 'drill,' under HABITUATION (q. v.). (K.G., J.M.B., E.B.T.)

Einfühlung: see SYMPATHY (aesthetic) (Lipps; who also, *Zeitsch. f. Psychol.*, xxii. 415, uses the more general term Beseelung, which, however, has its English equivalent in ANIMATION, q. v. above); so also Volkelt, 'Zur Psychol. d. aesthetischen Beseelung,' *Zeitsch. f. Philos.*, CXV. (1898) 161. (J.M.B., W.M.U., E.B.T.)

Einfühlung is not a happy term: (1) because it confuses two distinct things—(*a*) aesthetic personification (as 'The Gothic tower has an upward impulse'), and (*b*) inner sympathy (as 'I am carried up with the Gothic tower')—and (2) because the term is too narrow, since the process involved is not confined to feeling. (K.G.)

Einstellung. It is recommended that Einstellung be the equivalent of the acquired DISPOSITION (q. v.) only, not including the (inherited) PREDISPOSITION (q. v.). If ANLAGE (q. v. above) be rendered rudiment, then the mental rudiment shows itself as a predisposition, not as an acquired disposition.

Einstellung has the further meaning of a temporary 'setting' or fixing. (J.M.B., K.G., H.M.)

Empfindsam (and **-keit**): SENTIMENTAL (and -ITY), ad fin. (q.v.). (J.M.B., K.G.)

Geist: see SEELE (below).

Gemein-: see GESAMMT- (below).

Gemüth: affective-conative disposition or function. See GEMÜTHS- (below). (J.M.B.)

Gemüths-: affective-conative (process, &c.). See AFFECTION, for the usage of Gemüths- as equivalent to affective (see also under EMOTION). Titchener (*Amer. J. of Psychol.*, vii. 81) gives this rendering. Eisler (*Wörterb. d. philos. Begriffe*, 'Gemüth') gives the usage of various German authors. The one thing that is common in the various definitions seems to be that cognition, reference to mental objects as such, is excluded (so Waitz, *Lehrb. d. Psychol.*). This means that anoetic consciousness would still be Gemüth, whether conation be finally eliminated from it or not. The English word 'temper' comes nearest, possibly, to an adequate rendering (denoting the inner or psychic aspect covered by Gemüth, as TEMPERAMENT, q.v., sets forth the same as psychological or objectively observed). See the historical note in Eucken (*Gesch. d. philos. Terminol.*, 211 f.), from which we take the following sentence of Volkmann: 'Die Seele wird Geist genannt sofern sie vorstellt, Gemüth sofern sie fühlt und begehrt.' In seeming agreement with this is Wundt's declaration (*pace* his usage!): '. . . wurde häufig in neuerer Zeit das Fühlen und Begehren in *Gemüth* zusammengefasst und demnach die ganze Seele in Geist und Gemüth gesondert' (*Physiol. Psychol.*, 2nd ed., 11).

(J.M.B., G.F.S., K.G., H.M., E.B.T.)

Gesammt- (in compounds): composite, complex, resulting from the union of parts—as Gesammtbild, composite image; Gesammtvorstellung, composite (or resultant, Titchener) idea; Gesammtwille, GENERAL (or COLLECTIVE) WILL (q.v., see also TRIBAL SELF). Cf. also AGGREGATE (idea). It differs from Gemein- and Allgemein- (in compounds) in that it *is* composite, while they *denote* what is composite. (J.M.B., E.B.T., G.F.S.)

Gesinnung: moral DISPOSITION (q.v.) or character as manifested in INTENTION (q.v.).

(J.M.B., K.G., H.M.)

Inbegriff: an inclusive concept; a concept from the point of view of its logical extension. Thus Eisler (*Wörterb. d. philos. Begriffe*) gives the following definition: 'Art: der Inbegriff ähnlicher, innerlich verwandter, Individuen.' Often also simply 'sum total': e.g. 'the horopter is the Inbegriff of all points seen single by the two eyes.' (J.M.B., E.B.T.)

Intuition: covers Anschauung, but in the way of overlapping. Anschauung is direct apprehension *as direct*, and it includes sense-perception; Intuition is direct apprehension as valid, rational, mystically true (the intuitio intellectualis of the mystics), and hence it is not generally used of sense-perception. Yet it is used of 'inner' apprehension at the same level as sense-perception. This is the distinction in general; it varies in the usage of particular writers. Cf. WAHRNEHMUNG (below). Cases are given by Eisler, *Wörterb. d. philos. Begriffe*, sub verb.

(J.M.B., K.G.)

Perception: see WAHRNEHMUNG (below).

Seele and Geist. In general usage Seele has come to mean mind as a whole in contrast with Geist, the intelligence, and GEMÜTH (q.v., above), feeling and will; that is, the phenomenal mind, as is seen in the terms Seelenleben, Seelenvermögen, &c. The meaning 'soul' accordingly falls into the background, and is brought out by some such term as Seelensubstanz. In adjective forms, however, this difference is obscured, e.g. Geisteswissenschaften (mental science), Geistesstörung (mental disorder). Geist is sometimes used when opposition or lack of connection between mind—i.e. SPIRIT (q.v.)—and body is brought out (Geist und Körper); Seele, when the relation between them is had in mind (Seele und Leib). Originally, Seele meant the breath and then the life principle (as the ψυχή of the Greek and the *nephesch* of the Hebrew); and the context often gives it still the descendant-meaning soul, as in Seelenwanderung, Seelenerrettung, Seelensitz, &c. Eisler, *Wörterb. d. philos. Begriffe*, gives citations; and discussion of the two terms is to be found in Wundt, *Physiol. Psychol.*, Einleitung, 2. Cf. ÂME AND ESPRIT (below).

(J.M.B., K.G., H.M., E.B.T.)

In scientific usage, Geist is avoided altogether, Seele is used for soul, and mind is expressed by das Psychische, geistige Erscheinungen, &c. (H.M.)

Selbstzweck: see AUTOTELIC. In English there is no noun for this concept of the 'self-end'; but the adjective 'autotelic' may supply the need, as in the phrase 'autotelic function' (a function having a Selbstzweck). (J.M.B.)

Sensibel: see SINNLICH (below), and cf. WAHRNEHMUNG (below).

Sensibilität: sensibility in the technical meaning given it by some (Külpe) when

Empfindlichkeit is translated by SENSITIVITY (q. v., especially remarks ad fin.). (J.M.B.)

Sinn: see MEANING (above).

Sinnlich: see SENSUOUS. Often equivalent to sensibel ('sensible' and 'sense-'; see SENSE DISCRIMINATION, ad fin.) and to wahrnehmbar. The noun Sinnlichkeit denotes the perceiving function (or faculty), being thus broader than Empfindlichkeit. (J.M.B.)

Sinnlichkeit: see SINNLICH (above).

Ueber-: equivalent to Lat. HYPER- (q. v., in philosophy) or Super-, which are used as English prefixes: so Ueberindividuell (see OVERINDIVIDUAL), Uebermensch (Nietzsche). (J.M.B.)

Uebung: see PRACTICE. The recommendations made *in locis* may be thrown together here with the English and other equivalents.

UEBUNG,	PRACTICE,	PRATIQUE,	PRATICA.
1. Vorübung,	preparation,	préparation,	preparazione.
2. Einübung,	habituation,	accoutumance,	assuefazione.
3. Ausübung,	exercise,	exercice,	esercizio.

The German terms are already in use (notably in Groos. *Spiele der Thiere* and *Spiele der Menschen*); hence the insertion of the table under this head. (J.M.B., G.F.S.)

Umfangsempfindlichkeit: RANGE (q. v.) of sensibility or sensation values (see Höfler, *Psychologie*, 92). (J.M.B., G.F.S., H.C.W.)

Verständlich: comprehensible (see COMPREHENSION). Used also in compounds, as *selbstverständlich* (self-evident), *unverständlich* (incomprehensible), &c. (J.M.B., K.G.)

Wahrnehmbar: see SINNLICH (above).

Wahrnehmung: PERCEPTION (q. v.); the process of the apprehension (Auffassung) of present objects. (Sinnes-)Anschauung is rather 'sense-intuition,' the recognition of present objects as such, apprehended by little or no subjective process, or even with denial of such process (cf. INTUITION, 1). It belongs especially to sense-objects, but is often carried up in its meaning; while the German term Perception seems to belong mainly to objects in general and to be carried down to sense-objects, so as to overlap Wahrnehmung. (Wundt's use of Perception, for apprehension without attention, is in line with Leibniz.) For citations of the use of Perception see Eisler, *Wörterb. d. philos. Begriffe*, sub verb. (J.M.B., K.G.)

Willens- and **Willkür-** (in compounds): see CONATION for a general scheme of German equivalents for conative processes, where through error these two terms are reversed. Willens- should be given for VOLUNTARY (q.v.), and Willkür- for volitional. This agrees with Titchener's rendering, if we assume that his 'selective action'—Willkürhandlung—means VOLITIONAL (q.v.) action. It is supported by Höfler's decision as to Willkür- ('willkürlich = das Gewollte,' *Psychologie*, 512). Höfler, however, rejects the term Willens-(handlung) altogether as being too ambiguous in current German usage (ibid. 535 f.). Judd (Eng. trans. of Wundt's *Outline of Psychol.*, 'Glossary') gives volitional for Willens- and voluntary for Willkür-, but reverses the meanings which we give for the English terms (i.e. he makes volitional = the lower conative, and voluntary = the higher or 'willed' —that which involves an act of volition). This means that he agrees with our recommendation as to the meanings of the German terms, but applies to them (*nobis iudicibus*) the wrong English equivalents. (J.M.B., G.F.S.)

III. FRENCH.

The difficulty of acquainting oneself with French and Italian usage is enormously enhanced by the lack of Indexes in the books. It is their own fault if authors in these languages continue to handicap the use and appreciation of their books as works of reference, and even for topical reading, by this extraordinary limitation. That they continue to make this omission—or to allow their publishers to make it—is unaccountable to the worker in English or German.

On French renderings for scholastic terms see the *Rev. Néo-Scolastique*, 1898–1902, for a series of articles. (J.M.B.)

Âme and **Esprit**. In the usage of these terms we find a development analogous to that of the German SEELE AND GEIST (q. v., above). Like Geist, esprit meant at first breath (*πνεῦμα*), then the life principle, and finally spirit, considered as that which is separable or separated from body; over against this, âme is the soul *in the body*, the soul in relation to *its* body. Then the predominant function assigned to intelligence in the rational or spiritual principle led to the transition by which esprit came, like Geist, to mean the intelligence, while âme in contrast meant mind as a whole (cf. the article 'Esprit' by De Rémusat in Franck's *Dict. des Sci. philos.*). There is a similar shading of meanings in popular English usage of the words soul and mind. We say a man has little soul, meaning that he has little sentiment, feeling, 'heart'; but when we say he has little mind, we mean little intelligence. (J.M.B., TH.F.)

Esprit: see ÂME AND ESPRIT (above).

Forme synthétique: see SYNTHETIC FORM (above).

Misonéisme: Misoneism, or hatred of the new (cf. Neophobia, under NEO-); used by Féré in a pathological sense, and by Lombroso (*Monist*, Apr. 1891) for social conservatism. (J.M.B.)

Mobile: see AFFECT. This term is already in use in such expressions as 'premier mobile' (prime mover), 'garde mobile,' &c.; and in its common signification of 'mover,' 'moving power,' &c., takes on readily the meaning suggested. (J.M.B., G.F.S., E.B.T.)

Tertium quid [Lat. for third something]. A medium or third thing through which a relation is established or maintained between two other things. See MIDDLE TERM, and PERCEPTION, ad fin. (J.M.B.)

Tertullian (Quintus Septimius Florens Tertullianus). (160–220 A.D.) Liberally educated, he became a lawyer of first rank and professor of rhetoric in his birth-place, Carthage. Converted to Christianity, he experienced a profound change of heart, becoming rigidly devout where he had formerly been indifferent. See PATRISTIC PHILOSOPHY (4).

Test (psychophysical): Ger. *Probe, Prüfung* (no adequate equivalent for 'test' —K.G.); Fr. '*test*,' *épreuve*; Ital. '*test*,' *prova* (De Sanctis), *saggio*. A determination of the normal character or marks of an organ or process together with its functional efficiency.

Measurements and tests form the basis of ANTHROPOMETRY (q. v.), and are valuable in the investigation of physical and mental development, of the correlation of physical with mental traits, and of mental traits with one another; of the effects of special training, of fatigue, of the action of drugs, &c.; as also in the elucidation of psychological methods, in the determination of the range and nature of individual variation and of class differences, and in the study of many of the general analytic problems of psychology. Those who lay stress upon the analytic and explanatory functions of psychology prefer to speak of the study of mental processes in respect to their functional efficiency as mental anthropometry; but the problems of mental anthropometry must be liberally interpreted, and their truly psychological as well as their practical character must be fully recognized. It should also be noted that results of mental tests frequently possess a considerable statistical value, even when their bearing upon individual characteristics seems uncertain or accidental. Indeed, many of the problems of mental anthropometry are in nature statistical; and the application of the results to individual cases is often impossible, or of minor significance. The results of tests upon groups of individuals (pupils of various ages, boys and girls, the professional and labouring classes, the leisure and the unfortunate classes, &c.) often possess a maximum of interest and reliability.

Tests of bodily efficiency or capacity most usually brought into relation with mental tests are strength tests of various groups of muscles and breathing capacity; bodily height and weight, chest girth, size of head, height sitting, length of arm, &c., are usually recorded, as are also age, sex, nationality, occupation of father, and other personal details. Determinations of the speed, steadiness, accuracy, and character of movements, and the physiological efficiency of eye and ear—all involve some psychological factors, and are usually included in a psychological series.

What tests shall be excluded and what included in any series naturally depends upon the purposes of the investigation. When the tests are made, not in the execution of a special end or purpose, but with the general object of securing data of individual and class value, likely to yield significant, valid, and interesting results, the tests have, in the main, been composed of a selection from the following representative list.

A. *Tests of sensory capacity*: (*a*) for the eye, keenness and range of vision, correctness of colour vision; (*b*) for the ear, keenness of hearing, range of pitch-hearing, accuracy of discrimination of pitch; (*c*) for the skin, keenness of touch, sensibility to pain. (To be separately enumerated as involving both sensory and motor factors is the keenness of the muscle-sense combined with touch: see C, 4.)

B. *Tests of motor capacity*: (*a*) energy of contraction, e.g. the maximum pressure exerted upon a dynamometer by the right and left hands; (*b*) speed of contraction, e.g. tapping or trilling on a telegraph key at a maximum rate for ten seconds; (*c*) quickness of movement, e.g. the time needed to move the hand over a given distance; (*d*) accuracy and steadiness of movement, e.g. moving a point in a narrow groove without touching the sides of the groove, touching a given point with the end of a rod, throwing an object at a target (this group of tests as usually performed involves the co-ordination of eye and hand, and should properly be enumerated under a separate heading).

C. *Tests of perceptive capacity*: usually the accuracy of perception for small differences: (1) in sight, small differences of length, or area, or form, or position, or colour, or combinations of these; (2) in hearing, small differences of pitch or loudness of sounds; (3) in touch, small differences of length, or form, or texture (as roughness, softness); (4) in muscle sense and movement, small differences of weight by lifting, of length or form by moving the finger along contours; (5) in the time sense, small differences of time intervals between audible taps or visible or tangible signals.

D. *Tests of mental alertness and quickness*: (*a*) the time of response to a stimulus (simple reaction) addressed to the eye, or ear, or skin; (*b*) time of discrimination, as in indicating all the *a*'s in a printed page, finding all the reds in an array of colours, or a given form amongst a group of forms; (*c*) time of distinction and choice, as in reacting by different and appropriate movements according to the object presented; as in sorting colours, forms, or letters into different boxes, or in touching a designated key according to which one of a number of different stimuli is made to appear.

E. *Tests of memory and of more complex mental processes.* (*a*) *Memory*: (1) range or span of memory, e.g. the maximum number of numerals or letters or nonsense-syllables which can be repeated after a single hearing or a single reading; (2) the accuracy of memory in reproducing or in recognizing more extensive series of sense-impressions, and the determination of the kinds and frequency of errors; (3) the type of memory, especially in regard to language, to what extent in terms of ear, eye, or muscle images; (4) duration of memory, the loss in vividness and accuracy after varying intervals of time. (*b*) *Association*: the time of response to a sense-impression or word by an associated impression, e.g. the time needed for a word heard or seen to arouse a related word, the time needed to answer a question depending upon a simple memory-association, to translate from one language to another, the time of multiplication or addition, the time needed to classify an object as belonging to a certain class, &c. The nature of the associations (or errors) may be suggestive. (*c*) *Attention*: concentration, as tested by susceptibility to intensity and kind of distraction. (*d*) *Imagination*: the vividness and nature of mental imagery as determined by general queries. (*e*) *Inventiveness* or logical alertness; as tested by the ability and quickness in solving simple puzzles. [(*f*) *Constructiveness*: tested by the ability and time required to fill in unfinished sentences correctly or intelligibly.—J.M.B.]

F. *Observation and judgment*: e.g. the correctness with which the number of steps in a familiar flight of stairs can be recalled; with which the arrangement of the doors and windows, or the size and proportions of the floor-plan, of a familiar building can be reproduced; the accuracy with which the sizes of familiar objects (current coins, stamps, or notes) can be reproduced or estimated in inches; or with which impressions frequently seen, but not consciously attended to (the shape of the prints of a dog's foot, the arrangement of the seeds in an apple), may be summoned to mind and reproduced.

G. *The aesthetic judgment*: this has occasionally been tested by means of tabulating preferences of colours or of colour combinations, or judgments of the proportions of the sides of a rectangle, or the diameters of an ellipse, which are most pleasing.

H. *Interest*: interest has been tested by observing what details in a complex picture are selected for description, and the order and prominence of the points noticed; by asking for definitions or descriptions of simple objects and noting the character of the definitions, whether in terms of use, logical classification, external qualities, or others.

The above enumeration aims to include the more usual forms of mental tests; in several groups other tests may be of almost equal importance. Under group A, tests of absolute sensitiveness to light, or of the period of formation or duration of after-images, or tests of the delicacy of taste or smell, may be introduced; under B, degree of righthandedness, or of the effect of fatigue, or of the susceptibility to unconscious movements, or a general test of endurance; under C, the accuracy in judging when lengths or angles are divided in half, when lines form true right angles, or of rhythm in movement; under D, the time required for an impression (a letter, a colour, &c.) to act upon the retina long enough to be recognized, and various other forms of distinction and choice. The complexity of group E offers a large variability amongst the constituent factors of the processes involved. Conditions of weather and season, time of day, state of the subject's health, his preferences and distastes, his talents and deficiencies, his estimated standing in school studies, his ability to improve with

moderate practice, &c., have been noted in special researches and utilized in the determination of the correlation of these with mental conditions and processes.

The determination of the method of conducting a mental test is of co-ordinate importance with the selection of the most serviceable tests. The more general and important methods which are applicable to more or less extended groups may be enumerated as the methods of reproduction, of selection, of identification or recognition, of arrangement in order, and the recognized PSYCHOPHYSICAL METHODS (q.v.). Cf. MEMORY (experiments on).

Certain of these may be illustrated by the test of the capacity to distinguish between small differences in lengths of lines. A single pair of lines may be repeatedly shown, and the frequency of error in determining which of the two is longer may be recorded (*method of right and wrong cases*); various pairs of lines may be shown, and the degree of difference between them, which disposes the subject to venture a judgment as to which is longer, may be recorded (*method of just noticeable difference*); a line (or lines) may be shown and the subject be required to repeatedly draw a line equal to it (or them), and the average deviation of the reproductions from the standard as well as the variation of the several reproductions among one another may be recorded (*method of average error*). As described, the last method also exemplifies the method of *reproduction*; if a line equal to the standard is to be selected from a graded series of lines, it involves the process of *selection*, the degree of error and regularity of the process being still an item of record; if the standard line occurs irregularly among a large group of lines of various lengths, and is to be identified or recognized when it occurs, the method passes into that of *identification* or *recognition*, the frequency of correct recognition forming the main record, and the degree of error becoming of secondary importance (and in many cases not determinable). If a group of three, or five, or more lines forming a suitable series be presented in irregular order of length, and the subject be required to arrange them in correct order, the correctness of the arrangement (with reference to the degree of difference between neighbouring members of the series) and the degree of deviation from a correct order are recorded (*method of arranging in order*). While the problem of methods has been presented mainly in regard to the perception of small differences, it must also be considered in more or less modified form in other connections. Thus, memory may be tested by reproduction, or by identifying the original impression when and where it recurs; this involves the two functions of memory as the power of recollection and of recognition. Tests described under D (*b*) illustrate the method of recognition or identification; similarly, in memory-tests a group of words, forms, or colours may be shown a second time with some modifications from its appearance when first exhibited, and the number of the points of difference which can be detected and described becomes the record of the test. The merits and demerits of these and of other psychophysical methods cannot be here considered; but the importance of the criteria of practical, simple, and ready applicability, and again of easily computable and unambiguous results, may be emphasized.

Apparatus. Along with tests and method, the selection of apparatus and the details of execution of the test should receive careful consideration. Simplicity of construction and of manipulation, quickness in reaching the result, and appeal to natural interests, are requisites for general tests, as is also a maximum amount of definiteness in regard to the particular capacity which is tested. An enumeration of the more usual apparatus and devices used in connection with some of the above-mentioned tests may be appended.

A. (*a*) For keenness of vision the size of letters or forms which the eye can see or read at standard distances; these are measured by diopters (see VISION, defects of); for tests of colour-defect and colour-blindness see COLOUR-BLINDNESS. (*b*) For hearing, the maximum distance at which the tick of a watch can be heard by each ear separately; audiometers, in which the intensity of the sound is measured by the amount of resistance introduced into the circuit, have been successfully used. For the lowest audible tones a steel blade adjustable in length, or a set of wire forks (both made by Appunn), give the needed vibrations of from 12 to 30 per second; while for the upper limit a Galton's whistle (recently much improved in precision), or a set of steel bars of graded pitch, is satisfactory; for pitch differences a pair of adjustable tuning-forks, or an extensive set of graded tuning-forks, or a pair of variable tones produced, e.g., by a Gilbert's tone-tester, are necessary. (*c*) Keen-

ness of touch has been measured by the minimum weight which will arouse a sensation of contact, by the aesthesiometric test of the minimum distance between two points which can be felt as two; while sensibility to pain is usually recorded by the lower limit of a steady pressure at which pain is felt.

B. (*a*) The dynamometer in various forms is used; and if a written record is desired, an ergograph will record the degree of muscular effort exercised, and also the nature of the contraction and the aggregate amount of work performed by successive maximal contractions. (*b*) A key connected with an electric counter, or with a registering point on a kymograph, or with a mechanical counting device (or simply tapping rapidly with a pencil on a strip of paper), will measure rapidity of contraction. (*c*) This requires some accurate timing apparatus (see group D). (*d*) A narrow wedge-shaped slit in tin-foil cemented on glass, the subject being required to guide a needle point as far as possible towards the point of the wedge until the point touches the foil and closes an electric circuit; for the wedge-shaped slit may be substituted a narrow groove of more or less intricate design, the number of contacts in guiding the point along it being recorded; or the labyrinthine design may be printed in double parallel lines in colour, and a pencil guided between the lines. A description of a test for accuracy of aim is given above.

C. (1) For sight, printed lines, squares, circles, letters, &c., specially devised forms (form-alphabet) and colours offer easily constructed objects for the perception of small differences of length, area, shape, and colour. (2) The tone-testers and tuning-forks described above, A (*b*), are used. (3) For judgment of lengths, sticks or bars, or the sides of simple figures cut out of smooth cardboard, are satisfactory; and graded sets of cloths of variable mesh (bolting-cloths) or forms wound with graded wires are used for testing sensibility for relative roughness and smoothness. (4) Weights to be lifted are generally enclosed in uniform boxes of wood or hard rubber. (5) Tests of the time-sense involve the use of a metronome, tapping-key, recording tambour, or electric pen and kymograph.

D. The apparatus for this group includes a piece for measuring small intervals of time; the Hipp or d'Arsonval chronometer, the Fitz or Scripture pendulum, and the registering tuning-forks represent different types of this apparatus (see Reaction Time). The accessory apparatus consists of single and complex (five-finger) keys for reacting, of a means of producing simple sounds, of an exposure shutter for revealing letters, words, colours, &c., of a speech-key for recording the moment at which a sound is uttered, and of the usual electric accessories. Of devices for measuring single reactions by simpler mechanical apparatus, the principle of the differential pendulum offers the best promise of success and adaptability for general tests. If groups of successive reactions are to be measured, a stop-watch or an ordinary watch becomes sufficiently accurate; and the process of sorting cards, with colours, words, pictures, letters mounted on them, or of selecting all of a certain kind of impression from a large group of miscellaneous impressions, becomes a convenient form of experimentation.

E. For auditory memory articulated sounds offer a sufficient variety of impressions; for visual impressions a screen or shutter to expose objects for brief or longer periods, simultaneously or in uniform succession, is needed. For the remaining groups the required apparatus and accessories will be readily gathered from the descriptions given above.

Literature: Report of Committee on Tests, Psychol. Rev., iv (1897), 132–8; and Physical and Mental Tests, ibid. v (1898), 172–9; Cattell and Farrand, Physical and Mental Measurements of the Students of Columbia University, ibid. iii (Nov., 1896); Cattell, Mental Tests and Measurements, Mind (1890); Jastrow, Official Catalogue of Exhibits, Department M, World's Columbian Exposition (1893); and Amer. J. of Psychol., iv. 420; Münsterberg, Centralbl. f. Nervenh. u. Psychiat. (1891); Gilbert, Stud. from Yale Psychol. Lab. (1895); and Psychol. Rev., iii (1896); Kraepelin, Der psychol. Versuch in d. Psychiatrie, Psychol. Arb. (1895); Oehrn, Studien zur Individualpsychologie, ibid. i. (1896) 92–152; Binet and Henri, La Psychologie individuelle, Année Psychol. (1896); Galton, Inq. into Human Faculty (1883); Sanford, Course in Exper. Psychol.; Scripture, Gilbert, and others, Yale Studies, i. 93, ii. 40, and elsewhere; Hrdlicka, Anthropol. Investigations of Children; S. E. Sharp, Individual Psychology, Amer. J. of Psychol. (April, 1899); Titchener, Laboratory Manual of Exper. Psychol. (esp. Teacher's Ed.). Wissler, Correlation of Mental and Physical Tests (1901), Psychol. Rev. Monograph Supp., No. 16. See also under Laboratory and Apparatus. (J.J.)

Test Types: Ger. *Buchstabenproben, Sehproben*; Fr. *optotypes, caractères pour l'examen de l'acuité visuelle*; Ital. *tipi di prova ottica, scale di Snellen.* Quadrangular letters and numerals for the determination of the range of distinct vision.

The 'standard' eye (Snellen) sees two black objects on a white ground as discrete when the space between them subtends a visual angle of 1′. The test types in regular use are so chosen that the smallest can be read, by the normal eye, at a distance of 6 m. Acuity of vision is in this case expressed as $\frac{6}{6}$ or 1. If only the largest types on the sheet can be read at 6 m., $v = \frac{6}{60}$, i.e. the patient can read at 6 m. what he would, with a normal eye, read at 60 m.

Literature: JÄGER, Schriftscalen (1857); SNELLEN, Probebuchstaben z. Bestimmung d. Sehschärfe (1862; Eng. trans., 1873); HELMHOLTZ, Physiol. Optik (1896), 124; W. H. R. RIVERS, Reports of Cambridge Anthropol. Exped. to Torres Straits, ii. (1901) 12 ff. (E.B.T.)

Testament (in law) [Lat. *testamentum*]: Ger. *Testament*; Fr. *testament*; Ital. *testamento.* A voluntary disposition of all or part of a man's property, or rights, to take effect only upon his death; a will.

In the phrase 'will and testament,' the last two words are mere surplusage.

In early English law, the term testament was specially appropriated to wills of personal property, which came under the probate jurisdiction of the ecclesiastical courts; but for centuries 'will' and 'testament' have been synonyms (Bacon's *Abridgment*, Wills, A). 'Testamentum est voluntatis nostrae iusta sententia de eo quod quis post mortem suam fieri velit' (*Dig.* 28, 1, *Qui testamenta facere possunt*, &c., 1). The soul of the Roman testament was the naming of a universal successor, or 'haeres.' See WILL (in law). (S.E.B.)

Testament (The Old and The New): Ger. *Testament*; Fr. *Testament*; Ital. *Testamento.* Names applied to the Hebrew and Christian Scriptures.

The terms signalize their character as a testament or will sealed in the blood of the testator, symbolically in the sacrifices of the Old Dispensation, really in the sacrifice of Christ in the New Dispensation. (A.T.O.)

Testimony [Lat. *testimonium*, from *testis*, a witness]: Ger. *Zeugniss*; Fr. *témoignage*; Ital. *testimonianza.* The statement of a witness used as evidence, whether depositional or documentary.

Deposition is oral or written. All testimony is either *direct* or *circumstantial.* *Direct* testimony is a statement of the very fact in question. Testimony is, further, either *intentional* or *casual.* Intentional testimony is a statement made for the purpose of persuading those before whom it is laid of the truth of the facts in question. Testimony is further either *original* or *second-hand.* Original testimony is testimony to percepts, or perceptual judgments, of the witness. *Second-hand* testimony is testimony as to what the witness learned by testimony (strictly by original testimony, otherwise it would be third-hand, &c., testimony, or *rumour*).

There is a general tendency to believe what one is told; and, as in the case of other such tendencies, it should at first be followed, although cautiously and tentatively. Even when experience is wanting, as for example in examining a prisoner, although greater caution is required, the proper course is to begin with the presumption that the testimony is true, for unless we make such a presumption, no truth can ever be discovered. It is true that the unlikelihood of the matter of the testimony may cause immediate distrust, or even disbelief of it, but no persons are so frequently deceived as those who stop to weigh likelihoods before accepting or rejecting testimony, and who then form a confident opinion *pro* or *con.* Testimony should almost always be accepted as approximately correct, but always strictly on probation, as a subject of examination. In our legal proceedings, witnesses are subject to cross-examination. Everybody is agreed that this is an essential step in the inquiry, but in a historical inquiry no such thing is possible. Still the testimony can be tested in various ways; and this must be done. But in any case, the rendering of the testimony is a fact which needs to be accounted for; and by whatever theory it be proposed to account for it, that theory needs to be checked and tested. Properly handled, false testimony may often yield a great deal of information.

An experimental test may be readily performed by considering the least antecedently likely but necessary or highly probable consequence of the theory, which is susceptible of being confronted with observation direct or indirect. If this consequence is found, notwithstanding its unlikelihood, to be true, there is then some reason for believing in the theory proposed to account for the testimony. (C.S.P.–J.M.B.)

Test of Truth: Ger. *Kriterium* (or *Kennzeichen*) *der Wahrheit, Test* (little used); Fr. *critérium de la vérité*; Ital. *criterio della verità*. The criteria, standards, or norms for the ascertainment and recognition of truth and the distinction of truth from error are called 'tests of truth.'

In a broad sense, the means, of whatever kind, for the detection of errors of sense and for testing the accuracy of memory, the rules of logic, laws of evidence, canons of investigation in the various departments of inquiry, principles of authority, standards of opinion, &c., constitute such criteria or tests. More specifically as well as more technically, philosophical thinkers have distinguished between formal criteria and material criteria, between the tests of ultimate and derivative, rational and experiential, *a priori* and *a posteriori* truth. The formal criteria, as the name implies, relate to the form rather than to the content of propositions, and comprise the rules and canons of logic, the fundamental laws of thought; they have often been summarily stated as freedom from contradiction and consistency (Widerspruchslosigkeit and Folgerichtigkeit or Konsequenz: cf. Krug, *Wörterbuch*, sub verbis). The material criteria or tests of material truth have to do with the matter or content of knowledge; and the debated question arises whether it is possible to frame, or even to conceive, any one criterion or sets of criteria sufficient in all cases to distinguish between material truth and falsity. In opposition to the endeavours to establish such a test, many writers have urged, over and above the specific criticism of their principles suggested by different philosophers, that the idea of a universal material criterion is self-contradictory, since, as universal, it could not be made applicable to the various material contents in their particularity (cf. Kant, *Krit. d. reinen Vernunft, Werke*, Hartenstein, 2nd ed., iii. 86–7). In general, the preponderant movement of opinion is in favour of recognizing the plurality of criteria, formal and material, in correspondence with the various processes of thought and departments of knowledge, and against the search for a universal criterion, in spite of the classical attempts to discover one which have been made in modern times, e.g. the Cartesian advocacy of clearness and distinctness (Descartes, *Meditationes de Prima Philosophia*, iii; Leibnitz, *Meditationes de Cognitione, Veritate, et Ideis*: see also CLEARNESS AND DISTINCTNESS), as well as in antiquity (cf. E. Zeller, *Stoics, Epicureans, and Sceptics*, ii. v. B, on the criterion of the Stoics and its central position in their theory of knowledge). The distinction between first, intuitive, or *a priori* truths and experiential or factual truths brings into prominence the inquiry after criteria or tests of principles of the former kind. These have been variously formulated by different writers: universality in the sense of universal acceptance, known also as universal consent or catholicity (cf. Locke, *Essay concerning Human Understanding*, I, esp. I. i. 2–24, and Leibnitz, *Nouveaux Essais*, I, esp. I. i. 2–4), or in the sense of being true without exception (Kant, op. cit., 34–6), necessity, and evidence or self-evidence have enjoyed the greatest favour, while simplicity, incomprehensibility, independence, immediacy, irresistibility, &c., have also been proposed (cf. Sir W. Hamilton, *Reid's Works*, note A, iv, vi; J. McCosh, *First and Fundamental Truths*, 16–18, 34–57). Herbert Spencer defends the inconceivability of the negation—called by him the UNIVERSAL POSTULATE (q.v.)—as an adequate test of primary truths, which he holds to be *a priori* in the individual as the result of inherited experience, although they are *a posteriori* in the race (*Princ. of Psychol.*, §§ 420–37; cf. J. S. Mill, *Logic*, 8th ed., ii. vii. 1–4, and see INTUITIONALISM). Besides the criteria of truth at large and the tests of theoretical principles, attention has often been directed to the principles of morals and of taste as canons of ethical and aesthetic truth. In regard to such further questions as the relative authority of thought and feeling, reason and faith, reason and revelation, &c., see AUTHORITY, FAITH PHILOSOPHY, RATIONALISM, and REVELATION. See also SCEPTICISM, TRUTH, and ERROR. (A.C.A.JR.)

Tetanus [Gr. τετανός, rigid, from τείνειν, to stretch]: Ger. *Starrkrampf*; Fr. *(l')état tétanique, tétanos*; Ital. *tetano*. A state of continued contraction of a muscle due to rapid stimulations from a nerve centre.

A common case is that popularly called lockjaw. (J.M.B.)

Tetens, Nicolaus. (1736–1807.) Born and educated in the Landschaft Eiderstedt, he became professor of physics in the Pädagogium at Bützow in 1763; later, also director. After 1776 he was professor of philosophy at Kiel, and later of mathematics. In 1789 he became assessor, then councillor, in the college of finance at Copenhagen, where he died.

Text-blindness: see WORD-BLINDNESS.

Thales. (cir. 640–cir. 550 B.C.) A native of Miletus who founded the school of Ionian or Hylozoic philosophers, and who is called 'the father of philosophy.' One of the Seven Sages, a mathematician and an astronomer, he was also a man of affairs. No writings of his remain. See PRE-SOCRATIC PHILOSOPHY, and SCHOOLS OF GREECE (Milesians).

Theanthropism: See ANTHROPOMORPHISM.

Theism [Gr. Θεός, God]: Ger. *Theismus*; Fr. *théisme*; Ital. *teismo*. Theism is a term that may be applied either to a form of religious belief or to a philosophical theory. In the former sense, as a designation of religious belief, it has a broader and a more restricted meaning. Broadly, it may be applied to any form of religious belief which regards the object of its worship as supra-human, and in this sense will include not only henotheism and monotheism, but polytheism in its most undeveloped forms, as fetichism and ghost-worship. In the restricted sense the meaning of the term is limited to monotheism, and involves the belief in one Supreme Being who is the author or ground and governor of the world. Even as thus restricted theism will include three species, pantheism, deism, and what may be called theism in the specific sense. Cf. the various topics (especially philosophy and psychology of) RELIGION.

If we represent pantheism as a belief which does not distinguish God from the world, and tends to regard the deity as an impersonal principle, and deism as one in which God is not only distinguished from the world but is conceived as bearing to it the relation of a *deus ex machina*, theism may then be defined as belief in a personal being transcending the world in his nature, but not separated from it in his agency. Theism, in short, as a well-defined species involves a belief in the personality of the deity, as well as in his transcendence, in a sense that is not inconsistent with the immanence of his presence and agency in the world and in man.

I. *Theism treated as a religious belief.* The elements involved in the above definition are to be regarded as parts of a concrete, and, therefore, as implications rather than as definitely conceived characteristics. Theism, like pantheism, will exist as an attitude or disposition before it has taken the form of a conscious theory. In this sense it is clear that the history of theism, in the broad sense, will be bound up with that of the origin and development of religion in general, and will include the lower species or forms, such as fetichism and ghost-worship, as well as the more developed forms, polytheism, henotheism (uncritical monotheism), hylotheism (the belief that the material world is God), and monotheism.

But taking theism as defined above, it is evident that it will be exclusive of all pluralistic (polytheistic) forms and will have monotheism as its presupposition. The questions of its origin and development will, therefore, be bound up with the fortunes of monotheism. Cf. RELIGION (evolution of).

Without entering into the disputed question whether, historically, monotheism preceded or followed polytheism, or whether both grew out of an earlier form called henotheism, as Max Müller contends, we may safely maintain that, logically, monotheism represents the most developed form of religious belief. From this point of view theism is to be regarded as *that form of monotheistic belief which differentiates itself from pantheism, on the one hand, in the emphasis it places on the personality of God and his distinction from the world; and from deism, on the other hand, in its insistence on the immanence of the divine in man and the world.* Of the three distinctively monotheistic religions, Judaism, Christianity, and Mohammedanism, it will be evident that Christianity is the most developed in its theistic conceptions. In Judaism, and especially in Mohammedanism, the tendency at least is to assert the unity and transcendence of God at the expense of personal attributes and immanence. Christianity also insists on unity and transcendence, but its doctrine of the Trinity is evidence of the emphasis it places on personality, while its whole doctrine of the Holy Spirit is one of immanence.

II. *Philosophical theism.* This may be defined as critical theism, or *the theory that the universe is grounded in one infinite and absolute Being, whether the relation of this Being to the world be conceived pantheistically, deistically, or in a definitely theistic sense.* If philosophical theism be distinguished from the religious belief called theism, which, of course, it presupposes, it will be evident that here the issue between polytheism and monotheism will be transcended at the outset. Philosophical theism could only arise out of an effort of human thought to unify the world under the concepts of religion, and a plurality of deities would simply represent an irrational situation that was to be overcome before any real unification could be effected. Philosophical theism thus presupposes monotheism,

but must not be confounded with it. It is possible for monotheism to become reflective even without reaching the ground of philosophical theism. For example, among the early Greeks it is clear that Xenophanes reached his monotheistic creed through a process of reflection which led him to oppose the polytheism and anthropomorphism of the current religious beliefs. His position may therefore be regarded as an advance towards philosophical theism, but it is lacking in one important essential of that theory. So far as the records show it did not occur to Xenophanes to translate his monotheism into a principle of world-explanation. It was necessary that the gulf between theology and cosmology should be bridged over in the thought of some thinker before philosophical theism could be born. This great step seems to have been taken (with partial consciousness at least) by Anaxagoras, who, in postulating νοῦς (reason or intelligence) as the first principle and unifying ground of things, laid at the same time the foundations of a theistic conception of the world.

It is possible here to note only the most important stages in the development of distinctively philosophical theism. Passing over the thought of the Orient, which tended to pantheistic conceptions in religion (see Oriental Philosophy), and confining our view to that of the Western nations where the stages of the evolution are clearest, it may be said that the first great cycle of theistic development was accomplished in the reflection of Socrates and his immediate successors Plato and Aristotle. Socrates made the first application of the theistic principle in the sphere of the adaptation of means to ends in organic nature, and thus became the first exponent of what has since been called natural theology. Plato universalized the principle of Socrates, and, conceiving it in an ontological sense, identifies it with the idea of the Good, thus originating what may be called the onto-teleological method of conceiving God in relation to the world. Theism in Plato is mainly a principle of transcendent design and purpose, which is related to the world in a somewhat deistical sense. Aristotle translated this principle into one of immanent cosmology without sacrificing its teleological character. This is the significance of his doctrine of the 'Prime Mover' (see 'Mover and moved' under Motion, passim), whose self-activity is conceived to be the prius and spring of the world-movements.

The theism of Aristotle may therefore be characterized as cosmo-teleological, embodying as it does a synthesis between the transcendent purpose of Plato and the immanence of a cosmic principle. In the later Greek movements we find the immanent tendency dominating the thought of the Stoics and translating their religious conceptions into a species of cosmic pantheism, while in the later developments the transcendent teleology of Plato again triumphs, and in the movement called Neo-Platonism, which was also tinged with oriental mysticism, the religious conceptions take on the theosophic form, and the notion of God as a cosmological principle is largely lost in that of his transcendence and unity. This accounts for the tendency of this thought to renounce the phenomenal world, and to regard it as pure negation and evil. Cf. Socratic Philosophy, School of Greece, and Alexandrian School.

The initial movement of our era may be briefly characterized as a struggle, more or less successful, of the implicit theism of Christianity, which we have seen to be synthetic, to overcome the one-sidedness of the later Greek thought by emphasizing the personality or internal complexity of the divine nature and the immanence of its relation to the world through the agency of the Spirit. In the scholastic period, which first Platonic and, later, Aristotelian thought dominated, we find the traditional religious conceptions of these masters asserting themselves, modified by the tendencies of Christianity, and giving rise in the early period to the ontological realism of Anselm, and in the later to the theism of St. Thomas, which, while it is still realistic, is dominated by the cosmological conceptions of Aristotle. The whole theistic development of the middle ages is marked rather by an attempt to thoroughly digest and organize given elements, than by any decided advance in theistic conceptions. Cf. Patristic Philosophy, and St. Thomas (philosophy of).

Modern philosophy, beginning with Descartes and setting out from the doctrine of substance, developed, in its religious conceptions, in the direction of a pantheistic naturalism which culminated in the system of Spinoza. This led to a reaction which, beginning with the individualistic system of Leibnitz, culminated in the deistic theology of the 18th century, the term deistical theology being used here to designate not simply the work of the deists proper, but also that of the

natural theologians and Christian apologists of the time. The reaction from pantheism led in general to an over-emphasis of God's distinction from the world, and to mechanical conceptions of his relations to man and nature. The deistical movement closed with the criticism of Kant, which showed the necessity for profounder conceptions, and led, on the one hand, to the speculative theism of the Hegelian school; on the other, to the negations of agnosticism and the phenomenalism of the school of Ritschl. Speculative theism is frankly metaphysical, and identifies God with the absolute ground of being; while the opposing school, following the letter of Kant, seeks to divorce religious thought from all metaphysical and transcendental presuppositions. Cf. DEISM, IDEALISM, and RITSCHLIANISM.

The latest stage of the theistic development is associated with the doctrine of evolution, which seeks the whole causality of the world in an immanent process, and thus tends towards a species of naturalistic pantheism in its religious conceptions. This has been the dominating tendency, at least in the last decades of the 19th century, though there are not lacking at present signs of a reaction towards a point of view in which greater stress is placed on the divine transcendence. It would seem that in this regard there is no middle ground between conceiving God as a being who is something in himself apart from the world, and reducing his idea to that of a mere abstraction from, or generalization of, natural laws or processes.

In connection with the development of theism the most important problems have been those of the existence of God and his relation to the world. The former has led to the development of the theistic proofs, a topic that can be only very briefly handled here. Kant has classified the proofs employed up to his time under three heads: the *ontological*, founded on the idea of God in the human consciousness; the *cosmological*, which, as he conceives it, is an inference from the contingency of the finite to the existence of a necessary non-finite being; and, lastly, the *physico-theological* or *teleological*, which is an inference from the order and adaptation in nature to some final cause or purpose as its ground. Kant himself was dissatisfied with these proofs, and proposed the *moral argument*, founded on the infinite demands of man's moral nature, as the only adequate ground of belief in God. The history of the proofs may be divided into two periods: (1) the pre-Kantian, in which they were separately and somewhat uncritically developed; (2) the post-Kantian, in which, as a result of the trenchant criticism of Kant (anticipated also by Hume), the necessity of profounder treatment was recognized and religious thinkers began an attempt to unify the various lines of evidence, and to incorporate theism more completely with general philosophical principles of world-interpretation. The question of God's relation to the world has had a corresponding history. The somewhat shallow deism of the pre-Kantian period has given way to profounder views. It is no longer possible to conceive the same relation either mechanically or one-sidedly under the notion of transcendence. Assuming the immanent agency of God in the world, the alternatives open to the contemporary thinker are either pantheism, which frankly identifies God with the world, or a theistic conception in which a synthesis is aimed at between the notions of an immanent world-principle and a being that in its essential nature transcends the world of manifestation.

Contemporary theistic discussion presents three phases which can be but very briefly noticed: the *psychological*, the *epistemological*, and the *metaphysical*. The central question on the psychological side is that of the rise and meaning of the idea of God in the human consciousness. It is not overstating, I think, here to say that the trend of present thought is towards a view which may be stated in the proposition that the idea of God is natural to man, and that it takes its rise in social soil; that, in short, it is man as a *socius* who becomes a religious being. Cf. RELIGION (psychology of).

The epistemological question is that of the criticism of the idea of God as involved in the processes of human knowledge. Agnosticism, planting itself on the ground that the knowledge-process is finite and conditional, denies the possibility of conceiving a being that is infinite and absolute. It concludes either that God is unknowable, or that he is to be identified with the finite world of nature or humanity. In opposition to this we find a revival in contemporary thought of the old Augustinian contention that the very existence and possibility of truth and error in the finite sphere of human knowledge is founded on the necessary presupposition of an absolute ground of truth; in short, that the possibility of any knowledge involves *omniscience* as its condition. It is but another form of this conten-

tion to maintain that an infinite and absolute —that is, an ideally complete—experience is the necessary presupposition of an experience that is finite and fragmentary.

In the metaphysical field the principal questions under debate are (1) that of the relation of the concepts of religion to metaphysical principles. On the one hand, the phenomenalists or religious positivists, following the letter of Kant and denying the possibility of metaphysics, seek to construct a theism that shall rest exclusively on the evolution of humanity as a historic phenomenon. On the other hand, the sufficiency of this is denied, and it is contended that for an adequate basis of theism the notion of humanity must be related to that of an infinite and absolute ground; that otherwise the whole structure of religious knowledge is not secure against scepticism. (2) The second problem arises in the sphere of speculative theism, and concerns especially the relation of God to the finite individual. Assuming that God is the only absolutely real being, the problem is to find in his relation to the world an adequate ground of finite individuality. The older form of speculative theism attempted to conceive God's relation to the world under the categories of pure thought, and as a consequence found it difficult to vindicate any ground of reality for the individual. This difficulty has led to a profound modification of the position, by the incorporation of the categories of *will* and *feeling* into the very constitution of the absolute. God is thus brought not alone into conceptual, but also into volitional and emotional relations with his creatures. The world thus becomes the object of the divine purpose and love, and, inasmuch as these are *selective*, the individual finds a ground of reality or real justification in his relation to the absolute.

If now, going a step further, we represent the objective activities of the absolute as individuating in their very form and essence, so that no other than an individual result is to be expected, and if we connect this with the notion of the absolute stability and persistence of the divine activity, it would seem that we were in sight of a theistic conception in which it is possible to effect a synthesis between the notion of God as absolute reality and that of a perdurable finite individual possessing the reality of a moral agent.

Cf. MONOTHEISM; PANTHEISM, and the various topics RELIGION.

Literature: AUGUSTINE, Contra Academicos; ANSELM, Pros-Logium; HUME, Dialogues on Religion, and Natural Hist. of Religion; KANT, Rational Theology, in Critique of Pure Reason; and Religion within the Limits of Pure Reason; HEGEL, Philos. of Religion; LOTZE, Outlines of Philos. of Religion (Eng. trans.); BRIDGEWATER TREATISES (q.v.) on Nat. Theol.; PALEY, Nat. Theol.; RITSCHL, Theol. u. Met.; O. PFLEIDERER, Religionsphilosophie (also Eng. trans.); Gifford Lects.; and Devel. of Theol.; MAX MÜLLER, Gifford Lects.; and Chips from a German Workshop; FLINT, Theism; and art. Theism, in Encyc. Brit. (9th ed.); J. CAIRD, Philos. of Religion; ED. CAIRD, The Evolution of Religion; BOWNE, Philos. of Theism; J. MARTINEAU, A Study of Religion; PHYSICUS, A Candid Exam. of Theism; J. FISKE, Cosmic Theism, in Cosmic Philos.; and The Idea of God; H. SPENCER, The Unknowable, in First Princ.; J. H. STIRLING, Philos. and Theol.; R. M. WENLEY, Contemp. Theol. and Theism; FRASER, Philos. of Theism, Gifford Lects.; F. L. PATTON, Syllabus on Theism (printed, not published); ULRICI, Gott u. die Natur; ROYCE, The Conception of God; and The World and the Individual, Gifford Lects.; LESLIE STEPHEN, English Thought in the Eighteenth Century; Sacred Books of the East, ed. by Max Müller; D'ERCOLE, Il Teismo (1884). See the topics RELIGION. (A.T.O.)

Thema [Gr. *θέμα*, a deposit, dépôt, stakes, theme]: Ger. *Thema*; Fr. *thème*; Ital. *tema*. A word proposed in 1635 by Burgersdicius in his *Logic* (I. ii. § 1), for that 'quod intellectui cognoscendum proponi potest'; but what he seems to mean is what Aristotle sometimes vaguely expresses by *λόγος*, the immediate object of a thought, a meaning.

It is of the nature of a sign, and in particular of a sign which is rendered significant by a character which lies in the fact that it will be interpreted as a sign. Of course, nothing is a sign unless it is interpreted as a sign; but the character which causes it to be interpreted as referring to its object may be one which might belong to it irrespective of its object and though that object had never existed, or it may be in a relation to its object which it would have just the same whether it were interpreted as a sign or not. But the *thema* of Burgersdicius seems to be a sign which, like a word, is connected with its object by a convention that it shall be so understood, or else by a natural instinct or intellectual act which takes it as a representative

of its object without any action necessarily taking place which should establish a factual connection between sign and object. If this was the meaning of Burgersdicius, his *thema* is the same as the present writer's 'symbol' (see SIGN). (C.S.P.)

Theocracy [Gr. Θεός, God, + κράτος, government]: Ger. *Theokratie*; Fr. *théocratie*; Ital. *teocrazia*. Government by a god or gods.

The first known government, even when patriarchal, was theocratic. The most highly developed was perhaps the Jewish. The Mohammedan governments and the government (till lately) of the Papal States may be taken as modern instances. Theocracy is not involved in the mere recognition (as in classical Greece) of a divine power or powers over and above the political heads of the nation. In a theocracy the divine power, through his representative (the priests) or his word (e. g. the Koran), takes part in the actual political government. It is not enough for the ruler (as in ancient Rome) to be sometimes also the priest; in a theocracy it is the priest who is the ruler. (J.B.)

Theocrasy [Gr. Θεός, God, + κρᾶσις, mixing, a mingling with the divine]: Ger. *innige Verbindung mit Gott*; Fr. *absorption en Dieu*; Ital. *teocrasia*. That state of mystical blessedness attained by the Neo-Platonic or Hindu theosophist when by ascetic preparation and contemplation he overcomes the barrier which separates his individual consciousness from the Absolute One and loses himself in the divine essence.

The state here defined is not an exclusive possession of Neo-Platonists and Hindu mystics; it is in some sense the ideal of all mysticism. It is the tendency of the mystic to escape definition and distinction in the spheres of both thought and feeling. This presupposes a distinctionless unity as its goal, which, emotionally contemplated, is the mystic's ideal of heaven. (A.T.O.)

Theodicy [Gr. Θεός, God, + δίκη, justice]: Ger. *Theodicee*; Fr. *théodicée*; Ital. *teodicea*. A department of theology or philosophy which has for its aim the vindication of the goodness and justice of God in view of the existence of evil in the world; or, more technically, that department of theology or philosophy of religion which treats of the nature and government of God and the destiny of the soul.

Although many theodicies were developed before Leibnitz, he was the first to employ the name distinctively in his *Essais de Théodicée*, which appeared in 1710, since which the term has been in common use. The central issue in theodicies is the problem of evil in view of which the two opposing views of optimism and pessimism have been reached; the latter is the despair of its solution, and has received its classical utterance in Schopenhauer. The easy optimism of Leibnitz is no longer in vogue, and recent thought is pretty well divided between pessimism and the Kanto-Lotzian tendency to seek refuge in the demands of the moral judgment.

Literature: LEIBNITZ, Essais de Théodicée; WERDERMANN, Neuer Versuch zur Theodicee (1848); BENEDICT, Theodicaea (1882); J. YOUNG, Evil and Good (1861); SCHOPENHAUER and LOTZE, Philosophies of Religion; ROYCE, The Conception of God; and Studies in Good and Evil. See also RELIGION (philosophy of). (A.T.O.)

Theogony: see MYTHOLOGY.

Theological Ethics: Ger. *theologische Ethik*; Fr. *éthique théologique*; Ital. *etica teologica*. ETHICS (Christian). Ethics treated as a department of moral theology, and proceeding on the assumption of the absolute authority of Scriptures.

Literature: see ETHICS (Christian), and MORAL THEOLOGY. (A.T.O.)

Theology [Gr. Θεός, God, + λόγος, word or science]: Ger. *Theologie*; Fr. *théologie*; Ital. *teologia*. That part of the philosophy of religion which treats systematically of the Deity, his nature, attributes, and relations, and the grounds and limits of our knowledge of him.

Biblical theology: the systematic treatment of the doctrines of the Christian religion as contained in the Bible and developed in the history of the Church.

In the general sense, theology is a department of general philosophy. Biblical theology arises out of the application of principles of rational construction to the content of Christian revelation. Biblical theology is ordinarily divided into four branches—exegetical, historical, systematical, and practical or moral.

Literature: BELLARMINE, Disputationes de controversiis fidei; F. W. H. J. GASS, Gesch. d. protestantischen Dogmatik; Church Histories in general; HAGENBACH, Hist. of Doctrines (Eng. trans. by H. B. Smith); Herzog's Real-Encyc.; also Schaff-Herzog's Encyclopedia; Metzer and Welte's Kirchenlexicon; McClintock and Strong's Encyclopedia; systematic theologies, by HODGE, SHEDD, &c. (A.T.O.)

Theology (dogmatic): Ger. *dogmatische Theologie*; Fr. *théologie dogmatique*; Ital.

teologia dommatica. The system of theological doctrine developed dogmatically; that is, by a method whose ultimate appeal is not to reason, but to authority, either that of Scripture or of Scripture and tradition combined.

The basis of dogmatics in the Roman Catholic Church is a union of Scripture and tradition, while in the reformed churches, as a rule, the authority of tradition is rejected, and the dogma rests on the sole authority of Scriptures.

Literature: see THEOLOGY. (A.T.O.)

Theophany [Gr. Θεός, God, + *φαίνεσθαι*, to appear]: Ger. *Theophanie*; Fr. *théophanie*; Ital. *teofania*. (1) General: the revelation of himself which the Deity makes through his works.

(2) Special: God's revelation of himself in Christophanic form: in the Old Testament, in the Shechinah; in the New, in the incarnation, birth, baptism, and second coming of Christ. See CHRISTOPHANY.

In the general sense, the whole world may be regarded as a theophany or manifestation of the divine. In the special sense, God always appears in the person of the Son. (A.T.O.)

Theophrastus of Eresus. (cir. 370–288 B.C.) A Greek philosopher, pupil of Aristotle, for thirty-five years head of the Peripatetic School after the latter's death. See PERIPATETICS.

Theorem [Gr. *θεώρημα*]: Ger. *Theorem, Lehrsatz*; Fr. *théorème*; Ital. *teorema*. A demonstrable theoretical proposition. (C.S.P.)

Theory (in science) [Gr. *θεωρία*, a contemplation, speculation]: Ger. *Theorie*; Fr. *théorie*; Ital. *teoria*. A general principle or formula propounded for the purpose of explaining phenomena, as the 'theory of gravitation,' or the Newtonian theory.

In modern nomenclature it is confined to principles the truth of which has at least a large measurement of plausibility, in contradistinction to a hypothesis, which is propounded as a tentative explanation, the truth of which is to be verified or disproved by subsequent research. (S.N.)

The whole aim of science is to find out facts, and to work out a satisfactory theory of them. Still, a theory does not necessarily lose its utility by not being altogether true. It must be intelligible and diagrammatical, or it has no title to the name *theory*. The facts to which it refers are not necessarily facts of experience; they may be relations of pure mathematical forms. A theory is properly a result of systematic scientific consideration, not of mere casual suggestions; and thus the word bears a somewhat eulogistic implication in contrast to 'view.' Theory is opposed to fact; the latter meaning, in this connection, that which is forced upon us by perception; while theory is the part of science which is contributed by the intellect and confirmed by experiment. Theory is also opposed to practice; because a theory is a scientific product, and a pure, or theoretical, theory has regard to science alone, and is often in conflict with the practical theory, which ought preferably to be the guide of immediate action. But the latter is as truly a theory as the former, and ought equally (when practicable) to be a product of scientific examination. That which science recommends for its own use in a secular investigation may be different from what it prescribes as a basis for instant action.

Every theory has its beginning in hypothesis. For, except perhaps in pure mathematics, the presumptive adoption of a hypothesis is the only possible way of framing a judgment concerning things beyond perception; unless we consider instinctive judgments as an exception. Neither is the situation essentially otherwise in pure mathematics. A mathematical theory supposes a broad conception of the forms to which it relates. This is known to be true of them only by a process of demonstration, which in many cases has to wait for several years for its accomplishment, and in all cases must be subsequent to the first beginnings of the theory. It may be that a quasi-induction has created a belief in a mathematical theorem before it has been demonstrated. But a valid and genuine induction is not possible in pure mathematics, for the reason that genuine induction essentially relates to the ratio of frequency of a specific phenomenon to a generic phenomenon *in the ordinary course of experience*. Now in pure mathematics, which deals with figments of our own creation, there is nothing at all to correspond accurately to a course of experience. Suppose we find, for example, that in a complicated development there is a certain regular relation among the first terms. If there is no obscure demonstrative insight which assures us that this *must* be, it is quite possible that, as the series goes on, a state of things may intervene which interferes with that relation, and if so, the proportion of terms that will accord with that formula will presumably be very far from 1 : 1. There is, therefore, no security of the nature which belongs to induction, that as the instances

are multiplied the observed ratio will indefinitely approximate to the true ratio. This sort of induction, therefore, has no other validity than such as belongs to a hypothesis which suits the facts as far as we yet know them. If it is to be called an induction, it is a degenerate induction differing very little from hypothesis. It may properly be said, then, that even a pure mathematical theory is developed out of hypotheses.

No theory in the positive sciences can be supposed to satisfy every feature of the facts. Although we know that the law of gravitation is one of the most perfect of theories, yet still, if bodies were to attract one another inversely as a power of the distance whose exponent were not 2, but 2·000001, the only observable effect would be a very slow rotation of the line of apsides of each planet. Now the lines of apsides all do rotate in consequence of perturbations, which virtually do alter slightly the sun's attraction, and thus such an effect would probably only produce slight discrepancies in the values obtained for the masses of the planets. In very many cases, especially in practical problems, we deliberately go upon theories which we know are not exactly true, but which have the advantage of a simplicity which enables us to deduce their consequences. This is true of almost every theory used by engineers of all kinds. The most extraordinary departure from the known facts occurs when hydrodynamics is applied, where the theory is in striking opposition to facts which obtrude themselves upon every spectator of moving water. Nevertheless, even in this case, the theory is not useless.

In all the explanatory sciences theories far more simple than the real facts are of the utmost service in enabling us to analyse the phenomena, and it may truly be said that physics could not possibly deal even with its relatively simple facts without such analytic procedure. Thus, the kinetical theory of gases, when first propounded, was obliged to assume that all the molecules were elastic spheres, which nobody could believe to be true. If this is necessary even in physics, it is far more indispensable in every other science, and most of all in the moral sciences, such as political economy. Here the sane method is to begin by considering persons placed in situations of extreme simplicity, in the utmost contrast to those of all human society, and animated by motives and by reasoning powers equally unlike those of real men. Nevertheless, in this way alone can a base be obtained from which to proceed to the consideration of the effects of different complications. Owing to the necessity of making theories far more simple than the real facts, we are obliged to be cautious in accepting any extreme consequences of them, and to be also upon our guard against apparent refutations of them based upon such extreme consequences.

Whewell makes a great point of the relativity of the distinction between theory and fact. This is an important point that ought not to be overlooked. Every fact involves an element supplied by the mind, which if not, properly speaking, theory, is analogous to theory. On the other hand, serious errors of logic will result from not taking account of the difference between the intellectual elements already involved in the perceptual facts and scientific theories. A theory is a result subject to criticism, meaning by criticism, not the consideration of whether or how far an object is beautiful, useful, or the like, but the passing of a judgment as to whether the object *ought* to be as it is or as it is proposed to make it. If this judgment is adverse, the theory can and will be altered; and it will not be maintained by anybody until it is put into a shape to withstand his criticism. But it is perfectly idle, in this sense of the word, for anybody to criticize what he cannot help; and, like other idle and unamiable practices, it is also highly pernicious. Now all the subconscious work of the intellect in framing a percept and a perceptual judgment is beyond our control, and therefore not subject to logical criticism. It simply has to be accepted. Kant, perhaps, did not sufficiently appreciate this when he undertook to study the critic of such mental forms as space, time, unity, reality, &c.; but, after all, his deduction of the categories is merely in outcome that knowledge cannot be had on other terms; that is, that they are inevitable. Perceptual judgments, therefore, are, for the purposes of logical criticism, absolute facts without any admixture of theory. If a theory does not square with perceptual facts it must be changed. But the impressions of sense from which it is supposed that the percepts have been constructed are matters of theory. If the percepts were proved not to square with the impressions of sense, it would not at all be the percepts that would have to be reformed, for they cannot be reformed; it would be, on the contrary, that theory, that the percepts are constructed out of impressions of sense, that would have to be modified. (C.S.P., C.L.F.)

Theory of Knowledge: see EPISTEMOLOGY, and cf. GNOSIOLOGY, PHILOSOPHY, and METAPHYSICS.

Theosophy [Gr. *θεοσοφία*, divine wisdom]: Ger. *Theosophie*; Fr. *théosophie*; Ital. *teosofia*. (1) A stage into which philosophic reflection passes when its primary data are God and an organ through which he is revealed or mystically intuited.

(2) A form of Buddhistic thinking which from the postulate of a divine principle deduces the fundamental law of things, a vibratory movement of evolution and involution, the application of which in the sphere of psychic life leads to the process of perpetual reincarnation.

In the first or general sense most oriental thinking is theosophic. Modern thought first became distinctively so in Neo-Platonism, but the tendency has survived down to the present, and has taken on various embodiments.

The Buddhistic form is a direct importation from the East, and has Madame Blavatsky for its great apostle. It has many votaries, and seems to be a growing cult. Cf. MYSTICISM.

Literature: PLOTINUS, Enneads; PSEUDO-DIONYSIUS, Theologica mystica and De divinis Nominibus; works of JACOB BÖHME and SWEDENBORG. For the special forms, see Johnson's Cyclopedia, art. Theosophy; WM. Q. JUDGE, The Ocean of Theosophy (1893); SINNETT, Esoteric Buddhism (1883); RAMA PRASAD, Nature's Finer Forces (1890). (A.T.O.)

Therapeutics (mental): see PSYCHOTHERAPEUTICS, and MIND-CURE.

Thesis [Gr. *θέσις*, a placing or setting; also, in the modern sense, and apparently sometimes to mean merely a universal proposition]: Ger. *These*; Fr. *thèse*; Ital. *tesi*. An assertion formally stated preparatory to a regular defence of it by argumentation.

The Latin form *position* is less formal in its implication. The denial of a thesis preparatory to regular counter-argumentation is sometimes called the *antithesis*; but this is rarely used except with reference to Kant's antinomies. In geometry, the abstract statement of a theorem is called the *enunciation*, or first enunciation; the statement with reference to the diagram being called the second enunciation, or statement. The latter is also called the *ecthesis*, or *exposition*. For other meanings of thesis, see *The Century Dictionary*. (C.S.P.)

Thing (in law): Ger. *Ding*, *Sache*; Fr. *chose*; Ital. *cosa*. The object of a RIGHT (q.v., in law). It must be something capable of standing in a relation to the human will; it may be either material, or an object or group of objects only discernible by the mind (Holland, *Jurisprudence*, chap. viii. 85). *Simple thing*: one that can be comprehended, externally, by a single act of recognition, e. g. a horse. *Compound thing*: one to be comprehended only on a view of its several acts or properties, separately considered, e.g. a house. *Intellectual things*: those not material, e. g. an obligation, a copyright. *Divisible things*: things divisible without destroying their essential character or value. A house or horse cannot be thus divided; a pair of horses or block of houses might be (see Pollock, *Jurisprudence*, chap. vi). *Thing in action*, or *chose in action*: a thing not in the possession of the person with reference to its relation to whom it is considered. Not being in his possession, he, if the owner, may be forced to bring an action in order to get it. *Things fungible*: those which can be replaced by others of the same kind without loss to the owner, e. g. a barrel of flour of a certain brand. See RES. (S.E.B.)

Thing-in-itself: see NOUMENON, DING AN SICH, and KANT'S TERMINOLOGY, Glossary, 'Ding an sich.'

Thinking: see THOUGHT.

Thinking (in educational method). In general, the exercise of the intellect, specifically, in grasping the significance of facts presented in instruction.

Nearly all stages of school methods give the pupil's mind some exercise in thinking, but the phase of thinking deemed important enough to be designated as a stage or 'step' in method is the formation of generalizations. Dörpfeldt classifies the mental movements formed in a complete act of learning as follows: (1) Observation, (2) Thinking, (3) Application. Other writers, like Ziller and Rein, divide this second stage into Association and Generalization. See FORMAL STEPS, REFLECTION, and METHOD (in education). (C.DEG.)

Thisness [ME. *this*]: Ger. *Diesheit* (Wolff); Fr. *eccéité*; Ital. *ecceità*. Trans. of Lat. *haecceïtas*. See LATIN AND SCHOLASTIC TERMINOLOGY, II, and cf. Eisler, *Wörterb. d. philos. Begriffe*, 'Haecceïtas.' (J.M.B.)

Thomas à Kempis. (1380–1471.) Born at Kempen, near Cologne; was for seven years novitiate; entered, about 1407, the cloister of St. Agnes as regular canon, became superior, and died there. He belonged to the Brotherhood of the Common Life, founded by Ruysbroek and Geert de Groot.

Thomas Aquinas: see AQUINAS, THOMAS, THOMISM, and ST. THOMAS (philosophy of).

Thomasius, Christian. (1655–1728.) Education completed at Frankfort-on-the-Oder; travelled in Holland; professor of law at Leipzig, 1681; one of the founders of the University of Halle; professor of law there, 1698. Died at Halle. He was the first to introduce German as medium of university instruction; supported Spener and his school of pietists; was hostile to all pure speculation, and made notable innovations as a jurist.

Thomism: Ger. *Lehre des Thomas von Aquino*; Fr. *le Thomisme*; Ital. *il Tomismo.* The principles of St. Thomas Aquinas and his followers, who combined with certain doctrinal views belief in the ultimate harmony of reason and faith, and of the conclusions of philosophy with those of theology.

The doctrinal views held were unconditional predestination and efficacious grace, combined with conditional freedom of the will; physical as well as moral efficacy of the sacraments; and the denial of the Immaculate Conception. See SCHOOLMEN, and ST. THOMAS (philosophy of).

In the Thomistic unification of faith and reason, theology and philosophy, the ideal of scholasticism is practically realized. Doctrinally, St. Thomas is a mediating thinker, and embodies a moderating intelligence, which in general strikes the golden mean in Roman Catholic conviction and tendency. He is consequently the canonized thinker of the Church. (A.T.O.)

The Thomists were originally called Albertists, after the teacher of St. Thomas, ALBERTUS MAGNUS (q. v.). At first the Dominican Order took St. Thomas for their official philosopher. It was opposed by the Franciscan, which followed Alexander and Bonaventura. As the Nominalists were opposed to Thomism, and as the former came under the ban of the Church, there was a growing tendency for Thomism to become more and more the orthodox philosophy of the Church. It has received a notable revival in our own generation from the peculiar interest taken in it by Pope Leo XIII. (J.D.)

Literature: MIGNE, Patrology, Supplement; THOMAS HARPER, The Metaphysics of the School (1877); also UEBERWEG'S and ERDMANN'S Histories of Philosophy. An excellent history of Thomism is contained in the third and concluding volume of K. WERNER, Der heilige Thomas von Aquino. (A.T.O.)

Thought: Ger. (*das*) *Denken*; Fr. *pensée*; Ital. *pensiero.* (1) All cognition of objects other than sense-perception.

(2) The word is sometimes used as equivalent to conceptual process as such.

A train of thought consists of successive thoughts referring to the same object and determined by a single continuous interest centring in this object.

The thought function, considered as conceptual process, is usually treated as covering CONCEPTION, JUDGMENT, and REASONING, in the textbooks (see those topics for more extended matter). (G.F.S., J.M.B.)

Thought Reading. Another word for MUSCLE READING (q. v.).

Thought Transference: Ger. *Gedankenübertragung*; Fr. *transmission de pensée*; Ital. *trasmissione del pensiero.* See TELEPATHY, and cf. MUSCLE READING.

Threshold [AS. *therscwald*]: Ger. (*Reiz-, Empfindungs-*) *Schwelle*; Fr. *seuil*; Ital. *soglia.* LIMEN (q. v., also for foreign equivalents). Cf. LIMITS (of sensation and stimulus).

The term 'threshold' is sometimes applied to the stimulus, sometimes to the sensation. It was first used by Herbart and was given its present signification by Fechner. (J.MCK.C.)

The conception of threshold has been used in psychophysics (see PSYCHOPHYSICAL METHODS). The experimental threshold has been found to vary for various sorts of stimulation: (1) with the method of approach from above or from below, (2) with the direction of attention (distraction), (3) with the degree of fatigue; and to be influenced by conditions of relative summation and inhibition.

The least noticeable DIFFERENCE (q. v.) in sensation is called the threshold of discrimination or difference (Unterschiedsschwelle).

Literature: that of PSYCHOPHYSICS (q. v.) and PAIN (q. v.). (J.M.B.)

Tic [Fr.]: Ger. *Tic*; Fr. *tic*; Ital. *tic, ticchio.* A peculiarity or idiosyncrasy, particularly of motor form; applied specifically to movements of twitching.

Peculiar mannerisms of hemming or hawing in speech, of twitching a muscle, stroking the chin, rubbing the hands, clinching the teeth, tapping with the foot are as a rule quite within the range of the normal, although they are apt to be marked in neurotic individuals. At times, however, these tics are so peculiar and so removed from voluntary control as to constitute an abnormality. Such a patient may feel an irresistible impulse to interrupt his speech with an animal-like noise, to interject obscene expressions (coprolalia), to imi-

tate all that is heard (echolalia), or to mimic the movements of others (echokinesis), and so on. These impulses are closely allied to the working of the IMPERATIVE IDEA (q. v.). The intelligence is not affected, and at times intense effort may overcome the morbid tic; but it is often a chronic and incurable disorder.

Irresistible motor habits are termed convulsive tics, and the others psychic tics; while the more elaborate ones are termed co-ordinated tics.

Tic douloureux is an acute NEURALGIA (q. v.) of the trigeminal or facial (fifth cranial) nerve.

Literature: NOIR, Étude sur les tics (1893). (J.J.)

Tickle Sensation [ME. *tiklen*]: Ger. *Kitzel*; Fr. *chatouillement*; Ital. *solletico, formicolio*. A TOUCH SENSATION (q. v.), whose conditions are still obscure.

Tickling possibly includes a peculiar organic quality derived from the unstriped muscles that lie directly beneath the skin, and possibly a circulatory quality (tingling and itching: see ORGANIC SENSATION). Probably the muscular movement is wholly reflex, and the sense components in tickling are simply those of light and intermittent touches and temperatures, with which visual or other associations are conjoined. The muscular reaction of laughter is intimately bound up with the sensation.

Besides the well-localized tickle proper, described above, there is a sensation-complex, from rubbing and moulding the skin and muscles, especially in certain regions (e.g. the neck), which has very analogous, but more massive, reflex effects. This is also called 'tickling,' and is made use of in the games of children. It has never been analysed.

Literature: KÜLPE, Outlines of Psychol., 89, 147, 250; SANFORD, Course in Exper. Psychol., expt. 31; HALL and ALLIN, The Psychol. of Tickling, &c., Amer. J. of Psychol., ix. 1897, 1. (E.B.T.–J.M.B.)

Tiedemann, Dietrich. (1748–1803.) Born at Bremervörde and educated at Göttingen. In 1776 he became a teacher of ancient languages at the Collegium Carolinum in Cassel, in 1786 professor of philosophy and the Greek language at Marburg, where he died.

Tilt-board: see LABORATORY AND APPARATUS, III, B (*c*), (3).

Timbre: [Lat. *tympanum*, a drum, through Fr.]: Ger. *Klangfarbe*; Fr. *timbre*; Ital. *timbro*. The complex of overtones and noise that accompanies the FUNDAMENTAL TONE (q. v.) of a musical note.

It varies with the instrument, and thus enables us to recognize the source of the sound, as piano, harp, &c. It is sometimes termed clang-tint or quality (Helmholtz, Eng. trans., as below, Index, 'Quality') of a musical tone. It would seem better, however, to reserve the term quality for PITCH (q. v.).

Literature: HELMHOLTZ, Sensations of Tone, 119; SANFORD, Course in Exper. Psychol., expt. 90; TITCHENER, Exper. Psychol. (1901), expt. 8. (E.B.T.–J.M.B.)

Time [Lat. *tempus*; Gr. *χρόνος*]: Ger. *Zeit*; Fr. *temps*; Ital. *tempo*. The measurable form of continuity and externality of parts in all real (empirical) process. Time is constituted of the complex of relations of duration and succession in the experienced order of events. See SUCCESSION AND DURATION, and cf. CHANGE.

Time may be variously conceived, according to the point of view, as the order or arrangement of existences in these relations, as quantity or 'number' of changes relative to order of succession, and, again, as the ideal 'place' or medium in which these relations of duration and succession are found. These conceptions are general, applicable to an indefinite number of instances. But all times are commonly considered to be parts of one unlimited time. This one single time, however, is neither an individual conception nor an 'intuition,' but an object to which the general conception of time is applicable in a special way. There is no 'intuition,' i. e. perception, of 'pure' time, and the only way of representing it which is at all clear is by the imaginary synthesis of moving points or lines in space.

All accounts of time agree in connecting it with change. A changeless content, like a mathematical relation or a Platonic idea or, in general, valid meaning or truth, is not in time. But though change is essential to time, time is not the mere qualitative form of change. Nor is it mere succession or the mere abstract relation of succession. For succession to be temporal a relation of the terms is required such as to form a continuous and measurable series. The abstraction from the content of the relation of before and after in the continuity of a measurable process is temporal succession. The abstraction from the content of the total form of such a successive, continuous, and measurable process is time. Time is thus both continuous and

discrete, continuous as quantity, discrete as a measurable quantity divided into intervals of days, months, years, &c. These intervals designate and measure temporal duration. Duration, thus considered, consists in immanent measures and divisions of time. But since time is continuous as well as discrete, all time-intervals may be regarded as parts of one infinite whole of duration. The relation of time to duration may then be viewed in another way: time may be regarded as the process of the successive measuring of this whole. Since, however, the parts of time are only and always successive, a duration supposed to precede the succession would not be temporal. Time cannot be properly identified with a duration of this sort. The popular identification of time and duration merely implies, perhaps, a special emphasis on one of time's aspects.

Subjectively, each individual constructs his own time-order from the standpoint of the 'specious' or felt present by means of images in which past and future, not actually present, are represented. It is only from this standpoint that the terms past and future have proper meaning. In this construction are included not only the times of the individual's private experiences, but all times which may be dated from the present 'now.' Abstracting from the subject and viewing the constructed order objectively, we think time as uniformly successive in its parts and homogeneous throughout its entire length, wherein every 'when' is a 'now,' relative to the general determinations of before and after. This uniform and homogeneous order is further thought as endless and infinitely divisible. It is endless because every 'now' is relative to a before and also to an after; it is infinitely divisible as abstract continuous quantity. From the standpoint of actual experience, time is probably finite in both respects.

We have no definite standard for the measurement of time subjectively. We measure time, whether regarded from the subjective or the objective point of view, objectively on the basis of a comparison of independent series of rhythmic movements. No time-unit, accordingly, would seem to have any absolute length. If so, then one time is not separated from another time by any absolute interval. Time, as thus objectively measured, is time viewed physically, the time of objective physical happenings and of subjective processes looked at from the outside. But other orders of time are conceivable and, indeed, in a sense, actual. Such, for example, is the time of dreams, of works of imagination like an epic or a play; such, too, is absolute or mathematical time. An indefinite number of independent temporal series may thus conceivably coexist. Our idea of the time-order of the physical world—indeed, our specific idea of time generally—depends on the empirical fact of regularly recurring series and on our peculiar way of appreciating such series. It is doubtful, therefore, whether other ideas of time might not have been developed, or may not, in other orders of intelligent existence. And even with the same order of time considered abstractly there is perhaps no contradiction in thinking an entire reversal in the order of the content.

The abstract conception of time is full of difficulties and contradictions. Succession and duration are both essential, yet each, for itself considered, negates the other. In its uninterrupted succession time has no standing, but 'flows,' yet all succession is conceived of as being 'in' time as a sort of unity. But in time itself no unity is discoverable; the mere relation of before and after cannot constitute such a unity, and in the parts of time there is no least part which is not capable of being resolved into relations of this sort endlessly. The fleeting aspect of time early gave rise to the question of its reality. The past, it was said, is not, being past, and the future is not yet; hence time is never actual in any of its parts, for the momentary 'now,' taken strictly, is no part of time, but a limit, the beginning or end of a period. The successive, indivisible 'nows' afford a further difficulty. They cannot be conceived of as all the same, for it is essential to time that there should be an earlier and a later 'now.' But, on the other hand, it is not easy to see how the different 'nows' arise. Each, in vanishing, can neither give place to another immediately contiguous, for time is not like a sum or series of points, nor to one more remote, for the intermediate time is infinitely divisible; and it is still less possible that it should give place to itself. Ideally, in fact, there neither is nor can be a 'next' moment of time. Aristotle already notices most of the difficulties mentioned, and similar criticisms have been repeated and multiplied in all discussions of the subject since. Hegel gives perhaps the most forcible abstract expression of the inner contradictions of time when, in his own peculiar terminology, he describes it as 'die für sich seiende Negativität' (*Encyk.*, § 258).

The difficulties and contradictions in the

idea of time viewed objectively, i. e. in abstraction from the subject, and the obvious dependence of our actual time constructions on subjective processes, eventually led to a rehabilitation of the subject and to the production in the total stream of speculation of a steady and persistent current of opinion to the effect that time and temporal order have their sole being in and through such subjective constructions. This opinion is strengthened by the reflection that the content of all scientific, that is, true and complete, thinking is essentially timeless. Time may then be condemned as mere 'appearance' opposed to 'reality.' But the terms are ambiguous, and it is better to consider everything as real which is strictly taken for what it is and not taken for what it is not. The essence of the opinion above stated is that time depends on and derives its continuity, unity, and succession from the activity of a subject changelessly present in all its moments. But the subject is ambiguous: it may mean (*a*) the individual subject as opposed to the object, or (*b*) a principle of the subject as constitutive of objects. Either view is susceptible of modifications, each of which has its own special difficulties. Some of these will appear in the sketch of the history of opinion which follows.

History. Plotinus (*Enn.*, iii. 7. 7), in agreement with Aristotle (*Phys.*, iv. 10), says that time was commonly defined among the Greeks in three ways: (1) as motion, either (*a*) all motion, or (*b*) that of the celestial sphere; (2) as the moving sphere itself (an opinion attributed to Pythagoras, Diels, *Dox. gr.*, 318); (3) as a determination of motion, more particularly as (*a*) extent of motion (Stoics), or (*b*) number of motion (Aristotle), or (*c*) an accompaniment of motion generally (Epicurus). The only one of these so-called definitions that now interests us is that of Aristotle. Plotinus complains that none of them tells what time, in metaphysical reference, really is. This he himself attempts to do, following Plato. Aristotle's discussion of time is from the 'physical' point of view. The third important contribution to the subject in antiquity is made by St. Augustine, who formulates the subjectivistic-psychologic view. The development may be briefly traced in these three stages.

Aristotle predicates of time—he can hardly have meant the statement as a definition—that it is 'number of motion relative to before and after' (*ἀριθμὸς κινήσεως κατὰ τὸ πρότερον καὶ ὕστερον*, *Phys.*, iv. 11. 219 b 2). 'Number,' he explains, means here not the subjective number with which we count, but what is numbered (b 7). Time, then, is something numbered, or containing internal distinctions that can be counted and summed, which determines motion considered with reference to the succession of its parts. Though Aristotle's term for motion (*κίνησις*) includes qualitative change as well as change of place, the ideas on which his representation of time is moulded are all suggested by the latter. The 'before' and 'after' of time rest primarily on the analogous distinctions of position in space, the 'here' and 'there' successively occupied by a moving body (a 14). The continuity of time is derived from the continuity of motion, which, in turn, depends on the continuity of corporeal extension. Magnitude, motion, and time all go together (a 8 f.). So pervasive are these conceptions that Aristotle does not hesitate to speak of time as the number of the local movement (*φορά*) in which the 'now' is, as it were, borne along, like a moving point in space, as the generating unit (*μονὰς τοῦ ἀριθμοῦ*, 220 a 3). Thus he holds that the 'now' is in one sense always the same, while in another, as occupying different positions in the series, it is always different. In the identity of the 'now' he finds the ground of the self-identity of time taken as a whole, though relatively to motion time is always changing (219 b 10 f.). This purely objective, analogical view of time is obviously no solution of the problem. The identity and difference of the time-moments are certainly not given as objective facts. Nor are the contradictions involved in the conception of a being that never is, but is perpetually coming to be and perpetually passing out of being, removed by attaching time to motion. For Aristotle, the reality of time is coincident with that of motion; but motion is a conception which involves similar contradictions. From the purely objective point of view, these contradictions are unavoidable. But Aristotle suggests another point of view when he raises the question at the close of his discussion whether there would be any time if there were no such thing as soul. His reply is cautious, hypothetical. If, he says, nothing is capable of numbering but soul, and, indeed, intellect, then, if there were no soul, there would be no time, unless, e. g., motion is possible without soul (14. 223 a 16 f.). From the ordinary point of view, such is, of course, the fact, and in a 'physical' treatment of the subject Aristotle does not feel called on to transcend that

point of view. The problem finds its solution, if at all, in the wider context of his metaphysics, in which motion is brought into a relation with a prime mover, which is also Nous.

It is this metaphysical point of view which is prominent in the school of Plato. Plato himself treats of time (*Tim.*, 37 C–38 D) as a creation of the demiurge, 'a moving image of eternity' added to the world's other perfections that it might resemble as much as possible the eternal nature of the gods. This myth, though lacking in conceptual clearness, has at least the merit of definitely connecting time with an intelligent principle of existence whose mode of being, as Plato says, is not properly represented by diversity of sense. The Neo-Platonists are more explicit. Time, according to Plotinus (*Enn.*, iii. 7. 11)—and a similar deduction is found in Iamblichus (see Zeller, *Nacharistotel. Philos.*, 707)—is generated by the restless energy of the soul seeking to express in matter the infinite and eternal fullness of being. As it cannot do this at a stroke, it is forced to a successive series of acts. Time is this life of the soul, beheld and contained in it and subsisting with it, as, on the other hand, eternity is the life of intelligible being in its full, unbroken, absolutely unchangeable totality. In this view, which reappears in various modifications in the history of dynamic idealism (see e. g. Schelling, *Syst. d. tr. Ideal.*, Werke, i. 3. 465 f.), time is objective only because the object which it qualifies is subjectively determined; but subject and object are both embraced in a comprehensive unity which is timeless.

No one shows a keener appreciation of the contradictions involved in the purely objective view of time than St. Augustine (*Conf.*, xi). He believes, with Plato, that time is objective, it having been created by God with the creation of the world (*Civ. Dei*, xi. 5); but as to what it is, he confesses, 'si nemo a me quaerat, scio, si quaerenti explicari velim, nescio.' He is particularly disturbed by the fact that, while no part of it is, we yet measure it. The only solution of the paradox he can suggest is that time is present in and measured by the soul. There are not properly three times, a past which is not and a future which is not, with an intermediate present which is a mere point of transition between these two nonentities; but there is a present of things present, a present of things past, and a present of things future, the first in attention, the second in memory, and the third in expectation. Time, in itself considered, he concludes, is nothing, and cannot be measured; it only seems to be and to be measured in present comparison and regard. The novelty of this view consists in transferring the reference of time from the world-soul to the human soul. Yet Augustine cannot rest permanently satisfied with this view, for he still continues to regard time as an objective, divinely created fact. The two views are here manifestly at strife, and Augustine contributes nothing to their reconciliation. His distinction is that he first definitely presents the subjectivistic view of time as existing only in the present regard of a comparing consciousness. How this view is consistent with the recognition of an objective temporal order of events, he does not show.

Most, if not all, of the questions and the points of view concerning time debated and developed in antiquity reappear in the middle ages. Here, too, time is commonly regarded as a relation or aspect of motion, the two, according to some (Duns Scotus, Suarez), being 'materially' identical and only 'formally' distinct. Even the view that time is 'mobile quod movetur' is represented (Occam). In spite of numerous objections (for which see Duns Scotus, *Op.*, ed. Vives, iii. 141), the formula of Aristotle, or its equivalent, is generally accepted as a definition. As against the Averroists, the orthodox schoolmen hold that time had a beginning, though neither Aquinas nor Scotus find convincing reasons for the doctrine apart from revelation (see Stöckl, *Philos. des Mittelalters*, 556 f., 836 f.). Characteristic are the discussions of the differences between time, eternity, and 'aevum,' the last an attribute of the heavenly bodies and the angels, eternity being predicated only of God. The best opinion (Aquinas, *Summa Theol.*, i. 10) was that eternity is a 'res tota simul' without the beginning, end, or succession essential to time and capable of being conjoined with, though not essential to, 'aevum.' A further distinction, likewise of theological import, is made between the physical time which measures the motions of the heavens and spiritual 'discrete' time, composed of the indivisible, successive instants of change in the intellections and volitions of the angels and measured by the thought of the supreme Angel (Suarez, *Op.*, ed. Vives, xxvi. 961). The difficulty with regard to the reality of time arising from the view of the instant as a durationless limit

dividing a non-existent past from a non-existent future is commonly met, on the principle 'esse successivorum est fieri,' by simply declaring the parts of time to be actually successive. Suarez, however, though seeming to regard this as satisfactory, incidentally suggests a profounder solution when he says that the successive parts of an action, and hence their real duration, may be conceived as a whole in a form which is non-successive (op. cit., 958 b). He also considers the idea of time as a sort of space flowing from eternity as purely imaginary, and the location of a given duration in this space as a purely mental act. There is no repugnancy, he contends, in supposing the real duration of a given motion, absolutely considered, as recurring (op. cit., 954). But the radical conception of time as a mental construction through and through, which these utterances suggest, he does not grasp. This conception, however, in the general form that time depends for its existence on the soul, was also represented, notably in the case of one Aureolus, and was regarded as sufficiently important to be condemned by the bishop and University of Paris and to be discussed at considerable length by the schoolmen. Among the arguments in its favour, as reported by Albertus Magnus (*Op.*, ed. Vives, iii. 310), is the rather acute observation that if, as commonly supposed, time were generated by the motion of the celestial sphere, all the parts of time would be together, since the heaven moves in all its parts at once. A not uncommon solution of the difficulty implied in the accepted Aristotelian formula was that while number, and hence time, could only exist in the mind 'in actu,' it existed outside the mind 'secundum potentiam'; Albertus adds, as a further ground for the existence of time 'in se ipso,' the 'habitualem formam discretionis,' which first makes the numbering of things possible (op. cit., 339). The conclusion that even for the objectively thinking schoolmen time was really a product of mental construction with an objective basis of validity is obvious.

The schoolmen distinguished time, to which succession was essential, and duration, to which, as applied, for example, to God and the angels, it was not. This distinction reappears in various forms in the early period of modern philosophy in connection with a subjectivistic, or at least idealistic, view of time, a view which steadily gains ground and definition in the course of modern speculation. For Descartes time, derived, as he held, from a comparison of the durations of certain regular motions, was simply a way of thinking of duration in general (*Pr. ph.*, i. 57). How little the close co-ordination of time and space, unknown to the ancients and so familiar to us, was yet established, appears in the contrast in Cartesian philosophy between time as subjective and independently existing extension. Spinoza defines time similarly (*Cog. met.*, i. 4): it is an imaginary representation wholly without ontological significance. Unlike the schoolmen, he limits duration to finite existence (*Cog. met.*, ii. 1); the eternity under which we think the infinite existence of God is, therefore, by no means to be regarded as a kind of quantity (*Eth.*, ii. 45). With Leibnitz the distinction between time and duration is capital. Everything has its own duration, but not its own time; the former is an attribute of things which the latter, as something outside things, serves to measure (*Ex. de Malebr.*, Erd., 692). Time is of the nature of the 'eternal verities,' applicable to the possible as well as to the actual, therefore not a mere abstraction from experience (*Nouv. Ess.*, ii. 14). It appears thus as a sort of divine thought, an ideal rule or mode of connecting 'inconsistent possibilities,' independent of things as number is independent of the thing numbered (*Philos. Abh.*, Gerh., iv. 568). But Leibnitz does not further expound or explain this ideality of time, and elsewhere often speaks of 'time or duration' as an attribute of things themselves. This mode of speech gave rise to the traditional interpretation, according to which time is an obscure representation of a real attribute. It was currently defined in the school as 'ordo successivorum in serie continua' (Wolff, *Ont.*, § 572).

The classical expression of time's independent reality is found in Newton, who speaks of 'absolute, true, and mathematical time' as something which 'in itself and from its own nature flows equally, without relation to anything external,' and with no liability to change (*Princ. of Philos.*, v. 1). But the trend of British philosophy is also subjectivistic. This appears already in Hobbes' definition of time as 'phantasma motus quatenus in motu imaginamur prius et posterius, sive successionem' (*De Corp.*, vii. 3). According to Locke, however (*Essay*, ii. 14), the idea of time does not depend primarily on motion, but on succession of ideas and observation of distance in the parts of this succession. How succession of ideas gives rise to ideas of succession, and how

distance in its parts is observed, he does not explain. Moreover, his psychological analysis is hardly intended as a denial of the reality of absolute time, but rather presupposes it, limiting only our knowledge of it to its sensible measures. But in the context of an inquiry into the nature and limits of knowledge, where the relation of idea and object was everywhere confused, it readily lent itself to the more radical interpretation. Accordingly we find Berkeley, 'embrangled,' as he says, in inextricable difficulties when trying to think time in the abstract, declaring that time is nothing but the succession of ideas (*Pr. Kn.*, § 98; *Life*, 177), and in this he is followed by Hume (*Tr.*, Pt. II. sec. iii). Both writers, appealing to experience and refusing to recognize the reality of mere abstractions, deny that time is infinitely divisible, conceiving it rather as made up of discrete moments, each with the duration of a single idea[1]. The general criticism of this view is that it implies the wholly fictitious representation of experience as made up of trains of discrete ideas. More particularly, successive impressions cannot of themselves account for the perception of succession. Successive impressions may be subjectively distinguished without consciousness of time at all. Conversely, a mental process without successively distinguished parts is found, when measured by objective standards, to occupy a time-interval of appreciable and theoretically divisible extent. It is true, there is a least amount of time which can be sensibly experienced, and the time of our empirical consciousness is so far free from the perplexities involved in the infinite divisibility of the time of our intellectual construction. But this construction may not simply be ignored. Finally, the character of time itself is not rightly apprehended, and cannot, therefore, be rightly accounted for when permanence and continuity are sacrificed to mere succession; and the latter, which is not time at all, but at best only in time, is made to do duty for the manifold of relations implied in the temporal order. On the other hand, Newton's conception of time is full of obscurities and contradictions. An absolute time with an independent flow would seem to require another time in which it flowed and by which its rate of flow was measured, and so *in infinitum*. And the flowing of time, if literally taken, is quite unintelligible. Does it flow as a whole, or only in its parts? There is absurdity in either supposition. For if it flow as a whole, then as the whole of time includes both past and future, the latter must be always existent simultaneously. And the same is true if only the parts flow, for these are its parts. But does it flow at all? Why does it not rather 'stand' as the permanent medium for the flowing sequence of events? But this, too, is also impossible, if the purely objective view of time be taken; for the parts of time are successive. And there is the further difficulty about abstract time, that its parts are never together, and that there is no final term (cf. Lotze, *Met.*, 268 ff.).

In the Kantian doctrine that time is an *a priori* form of the inner sense, an intuition or form of intuition empirically real, i.e. valid, but transcendentally ideal, i.e. with no significance for things-in-themselves (*Diss.*, § 14, *Krit. d. reinen Vernunft, Tr. Aesth.*, ii), the earlier view of time as a way of thinking is developed and defined. The principal objection to Hume's theory is here met by the implied presence, to the succession of impressions, of the unchanging synthetic unity of consciousness. Here at last we find the unity which Aristotle desiderates in the identity of the moving 'now.' Again, the difficulties in the mathematical conception of Newton disappear, or, at least, appear less formidable, when it is seen that the continuity, homogeneity, endlessness, and infinite divisibility it attributes to time belong, not to an independent entity, but merely to the way we represent the connection of process in the objects of our actual or ideally possible perception. And the doctrine has the further positive advantage of plausibly explaining the wide range of our universal and supposedly *a priori* cognitions of time and of other cognitions of like character in which the mathematical conception of time is presupposed[1]. As in the case of space, Kant finds peculiar confirmation of his theory in the antinomy which results from taking the temporal order of events to be something independent of the subjective conditions of possible experience.

[1] Cf. Locke: 'a moment . . . is the time of one idea in our minds' (*Ess.*, loc. cit., § 9). Albertus Magnus (*Phys.*, iii. 3) cites Avicenna as objecting generally to the view of time as wholly mental, that it makes time consist of an aggregation of moments.

[1] Schopenhauer enumerates 28 *a priori* praedicabilia of time alone (*W. a. W.*, ii. 55 f.). Time, as such, is not the basis of any mathematical science, though Schopenhauer, and perhaps Kant, held it to be the foundation of arithmetic; but it is presupposed in the laws of motion and mathematical mechanics.

Kant, however, has made precise interpretation of his doctrine difficult, especially by his failure to distinguish clearly the psychological and the epistemological aspects of his inquiry and by the characteristic defect of his method in abstractly separating the process of perception from that of thought. Hence the oft-repeated criticism that the idea of time cannot be *a priori* because its development and special character are alike empirically conditioned; hence, too, on the other hand, the popular exposition which likens the 'intuition' of time to coloured glass as something independently given through which the percipient soul sees its world. Relying, however, on Kant's own distinction between the *a priori* and the innate, we are justified in interpreting the real import of his doctrine at this point as strictly epistemological, as consistent with any theory of empirical conditioning that admits the originality of the function, as meaning, namely, that the idea of time precedes logically and in principle the perception of every particular time; and this seems to reflection true. Again, since the 'time-intuition' is only possible as a function, and time *in abstracto* is only definitely representable by ideal constructions in space[1], we may reject as inadequate and misleading the coloured-glass analogy, and interpret Kant here as really meaning that time is merely a form of perceptual experience, indeed, but that this form is a function in sense of that constructive synthesis he elsewhere attributes to thought. The essence of the Kantian doctrine will then be that temporal order is a product of the activity of the subject to which all experience is relative. The further definition of time in Fichte, Schelling, and Hegel depends on the way they severally interpret the subjective principle and the total constitution of the experience it determines. But even the realistic Herbart, while postulating an 'intelligible' space, regards time as a purely objective 'Schein,' the 'number of change' (*Met.*, §§ 287 ff.). The most precise elucidation, and perhaps the most original development of the subjectivistic doctrine of time since Kant, may probably be ascribed to Teichmüller (*Met.*, 192 ff.). Teichmüller conceives time as entirely a perspective order given to objects by a timeless, substantial ego, and duration as a mere immanent measuring of that order. According to this, if we abstract from the perspective nature of consciousness and the comparison, through memory and expectation, of part of its ideal content with other parts, all chronological arrangement and temporal duration disappear. The bare concept of time, he says, has in it nothing of magnitude, just as the concept 'mammal' has in it nothing of the specific nature of tiger, sheep, and elephant. Further, the determination of magnitude in the realm of time is purely relative. Hence the duration of the world has no absolute magnitude, nor has any given time-interval, a day or a second. The objective time-order is a perspective view, like every other. It is the product of scientific thinking, based on comparison of individual consciousnesses and aided by language. It is the order of history, and this order is true, but also, like every other content of scientific truth, timeless. A real order of actual activities corresponds to the perspective order, but this is to be ultimately conceived as a technical system. As all determination of duration is relative, we cannot say that the future is separated by any time-interval actually given from the present or the past. Indeed, taken absolutely, the whole series of the world's phenomena must be regarded as being all together at once. But only an absolute consciousness could so intuite it.

The standing objection to the doctrine thus or similarly expressed is that it denies the metaphysical reality of change. This objection is urged in various forms. It is said, for example, that if time is merely a form of intuition or a perspective ordering of phenomena, then the world is really a changeless unity, and consequently not only is all effort on our part to determine in any degree the course of things illusory, but past and future are contemporaneous—Nero is still burning Rome and the unborn babe now lives—which is absurd. Again, it is urged, positively, that change, and therefore time, which is the form of change, is real. For at least, it is argued, the succession of ideas is real, since it is only as ideas that phenomena can properly be said to exist at all. If, however, the succession of ideas is held to be phenomenal, the reply is that while this may be true if 'ideas' are taken as 'objects,' yet it is not true of the necessarily successive series of synthetic acts whereby their succession is presented. But not only, the argument continues, is

[1] 'Ohne Raum würde Zeit selbst nicht als Grösse vorgestellt werden' (*Lose Blätter*, i. 54). 'Die reine Anschauung bedeutet hier nicht etwas, was angeschaut wird, sondern die reine formale Bedingung, die vor der Erscheinung vorhergeht' (*Reflex.*, ii. 126).

change real in the subject, it is also real in external things; for the specific changes and the specific order of change appearing in objects, as they are certainly not due to a mere *a priori* form of the subject, imply a real succession in things themselves. Some writers appeal directly to the 'trans-subjective' nature of consciousness[1]. Much of this criticism, however, loses its force when it is pointed out that the form of change, as such, is not time at all. Aristotle already distinguished between motion and time as number of motion. Time is a certain arrangement and measure of motion, a further determination of the content. It would be quite possible, therefore, to hold to any amount of real change and yet to regard the temporal view of such change as subjective. But the conception of a subject indifferently related to series of changes which it arranges in temporal order cannot, of course, be ultimate.

Literature: the citations made in the article; B. P. Bowne, Metaphysics (1882), 217–41; Shadworth Hodgson, Met. of Experience, Bk. I. chap. iii; Hans Kleinpeter, Raum- u. Zeitbegriff d. Mathematik u. Mechanik, Arch. f. syst. Philos., iv. 32–43; B. Tschitscherin, Raum und Zeit, Arch. f. syst. Philos., v. 137–58, 253–85; discussion by Bosanquet, Sh. Hodgson, and Moore, in Mind, N.S., vi. 228–40 (April, 1897), In what Sense, if any, do Past and Future Time exist?; E. H. Rhodes, The Measurement of Time, Mind, x. (1885) 346–62; Trendelenburg, Logische Untersuch., ii. 218 ff.; Wundt, Logik, i. 428–37; Renouvier's criticism of Lotze, Crit. philos., xvii. (1880) 49 ff.; G. Wallenberg, Kant's Zeitlehre (1896); G. S. Fullerton, The Doctrine of Space and Time, five articles, Philos. Rev., 1901, esp. art. iv; Bertrand Russell, Is Position in Time and Space Absolute or Relative? Mind, July, 1901; H. Münsterberg, Grundzüge d. Psychol., i. 231 ff. (1900); J. Royce, The World and the Individual, ii. 109 ff. (1901). See also Biblio. B, 2, *j*, and G, 2, *v*. (H.N.G.)

Time (cognition of). Of the various theories of the apprehension, cognition, or awareness of Time (q. v.), the following types may be distinguished. Cf. Extension.

(1) Intuitive and *a priori* theories, which hold in some form that time, whether duration or succession, is a part of the individual's 'mental furniture': a time moment or temporal character is contributed by the mind to the structure of its experience as such. This is called nativism, and may be either (*a*) 'nativism of product,' illustrated by the theory of 'innate ideas,' and by that of '*a priori* mental forms.' See Time (especially the view of Kant). Or it may be (*b*) 'nativism of process,' called also 'genetic nativism'—a class of views which hold that the awareness of time distinctions arises by some form of function or reaction of consciousness upon data of a certain character (see Temporal Sign). The function or way of acting is native to the mind, but it operates only on the stimulus of appropriate experiential conditions. Another view (*c*), which may also be classed as nativism, holds to an original temporal datum, a certain time-extent-attribute, or what we may call 'temporality,' attaching to experience as such. This is analogous to the 'extensity' theory of the cognition of Space (q. v.).

(2) Over against the nativism theories we find the 'empirical' theories. These—again under various forms—hold that time cognition is a gradual growth under the conditions of actual experiences of time. Bits of time are perceived, cognized, or experienced simply as such or as a property of events; and by abstraction and generalization time is built up as an independent mental object. The mind gets time out of its experience instead of contributing time to its experience.

The foregoing illustrates the older form of the discussion. The lines of opposition have been much blurred, however, by newer views of psychological function. These views treat the dualism of mind and its experience as largely a false dualism. Experience is a process, not a doctrine or series of data, and mind is also a process, and the two processes are not two but one. Hence all knowledge is in the same sense both native and empirical. This may be illustrated by the theory of temporality (and that of extensity in the matter of space cognition), classed above as nativism. It might just as well be classed as empiricism; for all the other attributes of experience which the empiricist recognizes (quality, intensity, &c. of sensation) are just as much 'native' as is this. Nothing but a mind could have any of them; but nothing but experience could beget any of them in a mind. The Kantian question—how is knowledge possible?—is put over again and an-

[1] Besides the references in Vaihinger, *Komm. z. Kant's Krit. d. reinen Vernunft*, ii. 403 ff., see especially Brömse, 'Die Realität der Zeit,' *Zeitsch. f. Philos. u. phil. Kr.*, cxiv. 27–63. Cf. also Lotze, loc. cit.; Ladd, *Theory of Reality*, 178 ff.

swered by denying the dualism of mind and its object. Knowledge or experience is the statement of the growth of a mind.

Psychologists generally hold the same type of theory for the two cases of space and time cognition, and the indications of individual views given under EXTENSION (q. v.) hold largely also for time.

Literature: see TIME; also the general works on psychology, and BIBLIOG. G, 2, *v.* (J.M.B., G.F.S.)

Time Measurement: see MEASUREMENT, and REACTION TIME.

Time Perception: see TIME (cognition of).

Time Sense: Ger. *Zeitsinn, Zeitbewusstsein*; Fr. *sens du temps*; Ital. *senso del tempo.* A general term, analogous to 'space sense,' covering all conditions, attributes, and relations of temporal perception and idea; used more especially for investigations into the comparison of short time-intervals (durations). Cf., however, the remarks made under SENSATION AND SENSE (2).

The psychology of time is not yet so far advanced as to allow of the formulation of general laws. We know that the temporal sense discrimination is, under favourable circumstances, influenced or even determined by RHYTHM (q. v.). It seems that the apprehension of duration has at least three distinct forms (for intervals up to 1–2 sec., from 1–2 sec. to 3 sec., and from 3 sec. upwards), and that temporal ideas are peculiarly dependent upon the degree and direction of attention. Systematic investigation was begun by E. Meumann. See TEMPORAL SIGN, and cf. TIME.

Literature: JAMES, Princ. of Psychol., chap. XV; WUNDT, Physiol. Psychol. (4th ed.), ii. 408; J. N. CZERMAK, Ideen zu einer Lehre vom Zeitsinn (1857); A. HÖRING, Versuche ü. d. Unterscheidungsvermögen des Hörsinnes f. d. Zeitgrössen (1864); E. MACH, Zeitsinn d. Ohres (1866); K. VIERORDT, Der Zeitsinn (1868); J. KOLLERT, Zeitsinn, Philos. Stud., i. (1882) 78; V. ESTEL, ibid., ii. (1884) 37, 475; M. MEHNER, ibid., ii. (1884) 546; R. GLASS, ibid., iv. (1887) 423; G. T. FECHNER, ibid., iii. (1884) 1; Abhandl. d. k. sächs. Gesell. d. Wiss., xxii. (1884) 3; L. T. STEVENS, Mind, xi. (1886) 393; M. EXNER, Der Zeitsinn (1889); H. MÜNSTERBERG, Beitr. z. exper. Psychol., ii. (1889); H. NICHOLS, Amer. J. of Psychol., iii. (1891) 453, iv. (1892) 60; S. THORKELSON, Unders. af Tidssansen (1885); E. MEUMANN, Philos. Stud., viii. (1893) 431, ix. (1894) 264, xii. (1896) 127; F. SCHUMANN, Zeitsch. f. Psychol., iv. (1893) 1, xvii. (1898) 106, xviii. (1898) 1. (E.B.T.)

Timidity and **Timidity Reactions:** see SHYNESS.

Tissue (in physiology) [Lat. *texere*, to weave]: Ger. *Gewebe*; Fr. *tissu*; Ital. *tessuto.* Structure formed of similar elements, cells, or cell-products.

The principal tissues are: epithelial, connective, muscular, nervous, bony, cartilaginous, and vascular. (C.F.H.)

Tissue (social): see SOCIAL TISSUE.

Tone [Lat. *tonus*, a sound]: Ger. *Ton*; Fr. *son, ton*; Ital. (1, 2) *suono*, (3) *tono.* (1) The auditory sensation produced by a regular vibration of air particles. This, the true tone, is sometimes termed the 'simple' tone. See HEARING.

(2) The note of a musical instrument; a compound tone or 'simple clang.'

(3) A musical interval, the major second (larger or smaller; 8:9 or 9:10). Also called a 'whole tone.' Cf. SEMITONE.

(4) A general term, characterizing the number and consonance of overtones (e.g. 'rich' tone, 'pure' tone, 'harsh' tone, &c.). (E.B.T.)

The term 'chord' is in use for a number of compound tones sounded together; it serves that purpose sufficiently well, as against 'compound CLANG' (q. v.). (J.M.B.)

Tone (in compounds). See COLOUR TONE, FEELING, or AFFECTIVE HEDONIC TONE.

Tone-deafness: Ger. *Tontaubheit*; Fr. *surdité musicale*; Ital. *sordità musicale* (or *tonale*). A diminished capacity, or inability, to distinguish tones in general, or certain tones and their musical relations.

As a deficiency in musical discrimination in perfectly normal individuals, it is probably not uncommon; such persons fail to appreciate musical effects, and may not be able to distinguish between tones as much as an octave apart (see Grant Allen, *Mind*, April, 1878). An unusual deficiency in the capacity to hear very high or very low tones is spoken of as a partial tone-deafness.

Tone-deafness as a symptom in cerebral defect akin to aphasia relates to the specific loss or partial failure, on the sensory or receptive side, of the general musical faculty. It is thus related to AMUSIA (q. v.), as word-deafness to sensory aphasia. It is not an auditory defect, for tones are heard as noises; but the capacity to discriminate pitches and musical relations is impaired. See also

DEAFNESS (mental). For literature see AMUSIA. (J.J.)

Tone Tint: Ger. *Tonfarbe*; Fr. not in use (L.M.); Ital. not in use. An attribute of simple tones consisting in part of 'volume,' in part of intensity, and in part of pitch or quality (which forms the basis of tone tint in Stumpf's theory). See Stumpf, *Tonpsychologie*, ii. 540. (E.B.T.)

Tonic: Ger. *Tonica*; Fr. *tonique*; Ital. *tonica*. 'Modern music effects a purely musical internal connection among all the tones of a composition by making their relationship to one tone as perceptible as possible to the ear' (Helmholtz). This 'one tone' is the tonic or keynote. See Helmholtz, *Sensations of Tone*, 240; Wundt, *Physiol. Psychol.* (4th ed.), ii. 80. (E.B.T.)

Tonic (in physiology): Ger. *tonisch*; Fr. *tonique*; Ital. *tonico*. (1) Relating to the condition of relative responsiveness of the nervous system; tone being a condition in which muscular (and mental) efforts can be continued without undue fatigue, and with energy and a feeling of pleasure. Lack of tone (atony) is the relative absence of such a condition.

Tone is also used to indicate the general functional status of the neuro-muscular apparatus. For a normal healthy tone are required the presence of nervous energy (i.e. a rested condition), proper nourishment and oxygen, a removal of waste products, and not too excessive work. Pathological deficiency in these respects is an important factor in NEURASTHENIA (q.v.).

(2) Various tonics are therapeutic agents which impart more or less permanent strength to the body or some of its organs. In this sense, nux vomica, strychnine, arsenic, iron are administered as tonics to the nervous system. It is customary also to speak of mental and moral tonics.

(3) Tonic, as opposed to clonic, is applied to spasms, in which the muscles remain in a state of continuous, rather than intermittent, contractions. Cramps and contractures are tonic spasms. See SPASM, and cf. EPILEPSY. (J.J.)

Tort [Lat. *tortus*, twisted, wrenched]: Ger. *Unrecht, Rechtsverletzung*; Fr. *tort, délit* (*Code Civil*, Liv. II, tit. 5, chap. ii); Ital. *torto*. A wrongful act, other than a violation of contract, injuring another and entitling him to a civil action.

If the act causes no damage, it is not actionable, and so not a legal tort; but nominal damages are sufficient, and these the law may imply in some cases. *Tort-feasor*: he who commits a tort. *Executor de son tort*: one who wrongfully acts as if he were an executor, and who can therefore be held to some of the obligations of an executor. The act which is a tort may also be a crime. In so far as it violates the rights of individuals considered as individuals, it is a tort; in so far as it violates the rights of the state (if at all), it is a crime. In English and American law the civil and criminal remedies must be pursued separately, for to sustain the latter more convincing evidence is necessary. In France they can be joined (*Code d'Instruction Criminelle*, Liv. I. chap. vi. 63; see *Dig.*, xlvii. 1, *de privatis Delictis*, 2).

'Generaliter iniuria dicitur omne quod non iure fit' (*Inst. of Just.*, iv. 4, *de iniuriis*, 1).

Literature: HOLMES, on the Common Law, chaps. iii, iv; MARKBY, Elements of Law, chap. xvi; SMITH, Right and Law, chap. viii; POLLOCK, Torts; Two Centuries' Growth of American Law, chap. v. (S.E.B.)

Totality: see WHOLE, and cf. UNITY AND PLURALITY.

Totem (-ism) [a North American Indian word]: Ger. *Totem, Totemismus*; Fr. *totem, totémisme*; Ital. *totem, totemismo*. A class of material objects (animals, plants, &c.) which the members of a community regard with superstitious respect, to which they hold themselves to be peculiarly and intimately related, and which becomes as well the social bond of union between fellow clansmen. The term was introduced by J. Long, 1791.

The totem is both religious and social. Its origin cannot be traced, but its extreme diffusion, both geographical and historical, entitles it to be regarded as a highly important factor in primitive mental life. It may be psychologically related to fetichism, but differs from the latter not only in its social significance, but also in that the influence attached to the totem covers all objects of a certain class, while the fetichistic powers reside in a special individual object only. The religious aspect of the totem is apt to involve the belief, or the myth, that the clan was by some mystery or miracle descended from the totemic animal or object; such animal or object thus becomes sacred, is tabooed as food, or for use in dress, and the proscription may extend even to the mention or sight of the object. The totem is looked to for protection from evil and the cure of disease. It is worshipped and respected, and a corresponding benefit is expected

from the totemic influence, while violations of its sacredness are severely punished. It enters into the ceremonies which attend birth, marriage, and death, and the assumption of the totem may characterize the rites of puberty.

Besides the clan totems there are also, but far less frequently, totems for men and women separately, and individual or private totems. The last may be selected by divination at the time of birth, or by dreaming of it at puberty, or in any other way which would naturally bring about a mysterious and hallowed connection.

On the social side the totem gives rise to a more or less elaborate system of clan and family relationships which may properly be spoken of as totemism. Indeed, the totemic is frequently a stronger tie than the family connection, and becomes a mark of cognizance for each member of the clan. The custom of exogamy or marriage outside the clan or totem requires a sharp recognition of the totem, and brings about a double totem, that of father and mother. According to the rule of descent, whether by father or mother (the latter more usually), the paternal or maternal totem passes to the child, thus ever widening and complicating the clan relations and regulations. The further recognition of special tribes as suitable companions for marriage, and the presence of sub-totems in special branches, may develop a most elaborate and complicated system of relationships. The totem becomes an important symbol of kinship, and is thus used in architecture (totem poles), in dress, and in decoration. (J.J.)

Literature: FRAZER, Totemism (1887); and Encyc. Brit. (9th ed.), art. Totemism (with references); MORGAN, Anct. Society (1878); TYLOR, Early Hist. of Mankind (1870); PIKLER and SOMLÓ, Der Ursprung d. Totemismus (1900); various authors in Reports of the Bureau of Ethnology (Washington). (J.M.B.)

Touch (physiology of): see SKIN.

Touch Sensation [ME. *touchen*]: Ger. *Tastempfindung*; Fr. *sensation tactile* (or *de tact*); Ital. *sensazione tattile, senso del tatto.* (1) Sometimes made synonymous with CONTACT SENSATION (q. v.), thus including CUTANEOUS SENSATION (q. v.), and also PRESSURE SENSATION (q. v.).

This usage is seen in the term active touch, the exploration of a surface by a portion of the skin.

(2) More properly restricted to cutaneous sensation proper. This is the usage of those who distinguish between cutaneous sensation and pressure sensation (e.g. Dessoir). Cf. HAPTICS. (J.M.B.)

Trace or **Residuum** [Lat. *trahere*, to draw, through Fr., and Lat. *re-* + *sedere*, to sit]: Ger. *Spur, Rest*; Fr., *trace, résidu*; Ital. *traccia, residuo.* The supposed deposit or effect left by a nervous or mental function whereby later performances of the function are facilitated. Cf. FACILITATION.

The terms carry a structural connotation, an actual marking or path-making being supposed in the brain. The theory of the DISPOSITION (q. v.) is coming to give a more functional interpretation to the facts, and that term is displacing these. (J.M.B.–G.F.S.)

Tractarianism: Ger. *die Ansichten der Tractarianer*; Fr. *Tractarianisme*; Ital. *Tractarianismo.* A system of High Churchism, originating in the work of the Tractarians (so called from the papers 'Tracts for the Times'), a body of Oxford divines of the Church of England, who united doctrinal assertion of the historic organism and creeds of the Church, the saving efficacy of sacraments, baptismal regeneration, real presence in the Eucharist, and the power of the keys, with the practice of a more aesthetic ritual and a severer ideal of asceticism for the clergy. It is also called 'the Oxford Movement.'

The Oxford movement, originating in the early part of the 19th century as a reaction against the rationalistic and secularistic tendencies of the Church, with such leaders as Keble, Newman, and Pusey, promised a comprehensive reform. Soon, however, disintegrating tendencies began to prevail, and the forces were drafted off on one side in the direction of liberalism; on the other, into a reaction towards the Catholic Church. The movement gradually lost many of its purest spirits, and Tractarianism became a synonym for Puseyism, with its retrospective keenness and prospective blindness of vision. The principal fruitage of the movement has been a development of ritual and a revival of clerical asceticism.

Literature: NEWMAN, Apologia pro Vita sua (1864–8), and Letters and Corresp. (1890); COLERIDGE, Memoir of the Rev. John Keble (1869); CHURCH, The Oxford Movement (1891); WILFRED WARD, W. J. Ward and the Catholic Revival (1893). (A.T.O.)

Traction Sensation: see PULL SENSATION.

Tracy, Antoine Louis Claude Destutt,

Comte de (called **Destutt de Tracy**). (1754–1836.) Educated for the army, he was a member of the States-General in France, 1789. Of the revolutionary party, he served under Lafayette, was arrested, and released only after the death of Robespierre. Senator under the empire, he voted to depose Napoleon and against the reactionary restoration measures. He was a commander of the Legion of Honour, and member of the Academy. He was a prominent personage among the French Ideologists. Cf. IDEOLOGY, and SENSATIONALISM.

Trade [AS. *trod*, footstep, track]: Ger. *Handel*; Fr. *commerce*; Ital. *commercio*. The business of exchanging goods, as distinct from producing them. Cf. INDUSTRY.

It is not always possible to draw a sharp line of distinction between trade and industry, because there is no such line between processes of production and exchange. In fact, production can hardly be said to be complete until the goods are in the right hands. The distinction of principle is apparently this: the gains of industry are those due to skilful application of *physical* processes; the gains of trade are those due to clear perception of *social* wants. (A.T.H.)

Trade Union: Ger. *Gewerkverein*; Fr. *syndicat d'ouvriers*; Ital. *società* (or *lega*) *operaia*. An association of labourers, engaged in the same business, for mutual assistance.

This assistance may take either of two main forms: mutual insurance, or the substitution of collective bargaining for competition. The latter is the more important, though by no means the more universal object.

A trade union has much greater power than an individual in dealing with a labour dispute, because it can enforce its demands by a strike. The greatness of this power creates a danger of unwise use—not so much in increasing the frequency of strikes as in trying to impose restrictions on the labour supply, which are disadvantageous to the public. The fear of these results caused the legislation and judicial decisions of the early part of the present century to be adverse to trade unions; but it is now generally believed that such legislation serves to accentuate the very evils it was intended to prevent. In fact, trade unions to-day are often more powerful in the legislature than out of it; and a 'new unionism' is growing up, especially in England, which relies on social and political means of advancing the cause of labour far more than on strictly industrial ones.

The mediaeval gilds were in a sense trade unions; but their conditions were so different from those of labour organizations at the present day that their inclusion under the same term is really misleading. The Knights of Labour, and other organizations of labourers arranged with little reference to community of craft, are not, properly speaking, trade unions at all. (A.T.H.)

Tradition [Lat. *traditio*, delivery]: Ger. *Ueberlieferung*, *Tradition*; Fr. *tradition*; Ital. *tradizione*. The verbal or other social form of handing down of historical material, as opposed to its preservation in written records. Cf. HISTORY, the following topics, and TRANSMISSION. (J.M.B.)

Tradition (in biology and sociology). The handing down of knowledge, behaviour, modes of life, &c., from generation to generation without physical heredity; applied also to that which is thus handed down. Tradition involves individual acquisition.

Birds have a singing tradition, dogs a barking tradition, &c., as is proved by the fact that the young brought up in isolation do not perform these functions perfectly or 'true to kind.' The process of acquisition by the young, with their subsequent possession of what is transmitted, has been called social HEREDITY (q.v., 2).

The facts of tradition have important bearings upon theories of INSTINCT (q.v.), EVOLUTION (q.v.; cf. ORGANIC SELECTION), COMPARATIVE PSYCHOLOGY (q.v.), and SOCIAL ORGANIZATION (q.v.). Cf. also ORTHOPLASY.

Literature: WALLACE, Darwinism; LLOYD MORGAN, Habit and Instinct; and Animal Behaviour; titles by ROMANES, GROOS, and BALDWIN cited under EVOLUTION (mental). See also (sociological) BARTH, Philos. d. Gesch. als Sociol., i. 113 f. (J.M.B., C.LL.M.)

Tradition (in law): Ger. *Einhändigung*, *Übergabe*; Fr. *tradition*; Ital. *tradizione*. Delivery of possession.

Tradition is a source of title to property by the law of nature; 'nihil enim tam conveniens est naturali aequitati, quam voluntatem domini volentis rem suam in alium transferre, ratam haberi (*Dig.*, xli. 1, *de adquirendo Rerum Dominio*, 9, § 3).

Literature: SAVIGNY, Recht des Besitzes. (S.E.B.)

Tradition (in theology): Ger. *Tradition*; Fr. *tradition*; Ital. *tradizione*. A mass of writings, which have been obtained either through alleged oral revelation or from uninspired writers, and which, together with the

written Scriptures, are accepted as authoritative in matters of doctrine and practice.

The principal bodies of tradition, in the theological sense, are the Jewish traditions, which are embodied in the Talmud, and the traditions of the Roman Catholic Church, which are composed of writings of the Non-Apostolic Fathers. The recognition of tradition as a source of doctrinal and practical principles is one of the features of Catholicism which led to the Reformation movement.

(A.T.O.)

Traducianism (in theology) [Lat. *traducere*, to train, propagate]: Ger. *Traducianismus*; Fr. *traducianisme*; Ital. *traducianismo*. The doctrine, opposed to CREATIONISM (q. v.), which teaches that the soul as well as the body is propagated in generation, and that God's work of creation ended on the sixth day in the creation of man, which was a racial and not an individual act.

Literature: SHEDD, Hist. of Christ. Doctrine, ii. 13. (A.T.O.)

Tragedy: see TRAGIC (3).

Tragic [Gr. *τράγος*, from *τραγῳδία*, tragedy, lit. goat-song, perhaps from the goat-skin costumes worn by early tragic singers in imitation of satyrs]: Ger. *tragisch*; Fr. *tragique*; Ital. *tragico*. (1) Relating to tragedy (see below).

(2) Suited to tragedy, or having the characteristics of events portrayed in tragedy. This in looser usage is nearly equivalent to terrible or calamitous.

(3) More definitely in aesthetics: that quality of experience whereby, in and through some serious collision followed by fatal catastrophe or inner ruin, something valuable in personality becomes manifest, either as sublime or admirable in the hero, or as triumph of an idea. The situation itself or its portrayal is termed tragedy.

The characteristic subjective effect is that of a complex of strongly painful and pleasurable elements existing simultaneously, both of which may be regarded as arising from sympathy—the painful elements from sympathy with the sufferer in evil, present or future (pity and fear); the pleasurable from sympathy with the noble or heroic character displayed, or with the triumph of some idea (as in the case of guilt overtaken by catastrophe). Cf. SUBLIME. In the case of the tragic in art, there is the additional element of the aesthetically pleasing form in which the action, character, or situation is presented. The tragic presupposes a greater magnitude in its objects or events than is necessarily involved in the pathetic (see PATHOS), and usually a more active collision. Formally, it is a species of aesthetic CONTRAST (q. v.) or of disturbed HARMONY (q. v.).

Plato pointed out the mixed character of the feeling of the tragic. Aristotle noted the serious quality and the element of magnitude in tragedy, named pity and fear as the emotions excited, and stated the result of tragedy to be the effecting of a CATHARSIS (q. v.) of such passions. He suggested also that the tragic catastrophe results from some fault or error. This, as the theory of tragic guilt, has been developed in various aspects by the school of Schelling and Hegel, especially by Vischer. Hegel regards it as the triumph of the universal, the idea, and the destruction of the individual. 'Presumption' or overstepping of the due bounds of finiteness on the part of the individual has been emphasized as tragic motive by Vischer, Carriere, and Zeising. The inevitable and inherently necessary character of the collision or catastrophe in many cases enhances the tragic effect; this has been interpreted (1) optimistically, by Hegel, Vischer, Carriere, and Schiller, who in some way make the loss of the individual exhibit the triumph of the idea, or of the moral nature; (2) pessimistically, by Schopenhauer and Bahnsen (*Das Tragische als Weltgesetz*, 1877). Recent writers (Lipps, Volkelt) reject the theory of guilt or poetic justice as applicable to more than a portion of tragic situations. Köstlin and Hartmann emphasize the element of contrast; according to Hartmann the tragic contrast is one requiring a transcendent resolution.

Literature: LIPPS, Der Streit ü. die Tragödie (1891); HARTMANN, Aesthetik (1886); BAUMGART, Handb. d. Poetik (1887); GÜNTHER, Grundzüge d. tragischen Kunst (1885); BEYER, Deutsche Poetik (2nd ed., 1887), ii; FREYTAG, The Technique of the Drama (Eng. trans.); KÖSTLIN, Aesthetik (1869); SANTAYANA, Sense of Beauty; KLEIN, Gesch. d. Dramas d. Griechen u. Römer, i (1865); VOLKELT, Die Aesth. des Tragischen (1897); and Zeitsch. f. Philos., cxii. 1 ff.; KÜLPE, Preussische Jahrb. (1899), xcviii. 264 ff. Cf. also Commentaries on Shakespeare by GERVINUS, ULRICI, and MOULTON. (J.H.T.)

Training: see EDUCATION, and INSTRUCTION.

Trance [Lat. *transitus*, passed over]: Ger. *Verzückung*, *Entzückung*; Fr. *extase*, *sommeil*, '*trance*' (TH.F.); Ital. '*trance*. A general

term covering certain very varied conditions of modified consciousness with their physical accompaniments, e.g. HYSTERIA, HYPNOSIS, ECSTASY, MEDIUM(ship), &c. See these terms. (J.J.–J.M.B.)

Trances in general are frequently characterized by a marked insensibility to ordinary stimulation, and a relative unconsciousness or altered consciousness of outward occurrences. The thoughts of the entranced subject may be sharply concentrated upon a narrow and absorbing range of ideas, frequently of a religious character; and he is usually unresponsive to any attempt to intrude other and more normal mental occupations. By attitude and expression, and it may be by spoken utterances, the individual indicates his or her profound alteration of personality, and the existence of an abnormal condition. Ordinarily, the automatic functions go on with but moderate interruption; but in extreme cases respiration and circulation are affected, and food is taken sparingly, or must be artificially administered.

The term is used variously and often vaguely. Many of the historical cases of ECSTASY (q. v.) are described as trance. Lethargy is another term often used as a synonym of trance; and cases of suspended animation or of exceptionally protracted and deep sleep are also called trance. The hypnotic condition was by earlier writers sometimes described as a trance state, and spiritualistic mediums and others who throw themselves into an hypnotic or similar condition are termed trance mediums. The altered conditions often exhibiting persistent automatism due to alcoholic excess have been described as alcoholic trance. Likewise cases of altered personality, such as that of Ansel Bourne (cited by Binet, *Alterations of Personality*), in which an individual takes up a new life with new surroundings and is totally ignorant of his own past, may be described as life in a trance. It thus appears that trance states present great varieties, and may ensue as the result of somewhat different abnormalities in the nervous system. As the nature of the physiological alteration which induces trance is unknown, the state can be described only with reference to the psychological symptoms which it presents. Of these a limited or altered sensibility to the ordinary stimulation of the environment, or a marked mental automatism of action, or an exaggerated suggestibility, or a rapt concentration, or a deep and almost coma-like sleep and insensibility, may be the most striking feature. Cf. the literature cited under the special terms referred to. (J.J.)

Transcendence (in theology) [Lat. *transcendere*, to cross a boundary]: Ger. *Transscendenz*; Fr. *transcendance*; Ital. *trascendenza*. The doctrine that God, in his proper being and essential nature, is prior to and above the world; or that he has reality in himself apart from his works.

Transcendence contrasts and correlates with IMMANENCE (q. v.). It may be asserted in such a sense as to isolate God from the world, in which case it excludes immanence. It was the character of DEISM (q. v.) that it associated with a one-sided notion of transcendence that of an external and wholly mechanical relation of the deity to the world. Extreme assertion of immanence results in pantheism or naturalism. Extreme assertion of transcendence leads to deism, or else thrusts God out of all conceivable relation to the world. (A.T.O.)

Transcendent (-al): Ger. *transscendent (-al)*; Fr. *transcendant (-al)*; Ital. *trascendente (-ale)*. (1) In scholastic thought, transcendent and transcendental were equivalent, and were applied to terms or notions higher than the CATEGORIES (q. v.) of Aristotle, and comprehending the latter. (The conception of the secondary character of the categories is due to Neo-Platonism.) Such concepts are *ens*, *unum*, *verum*, *bonum*, and afterwards *res* and *aliquid*.

(2) Kant distinguishes between transcendent and transcendental (though he is not always true to his formal definition). *Transcendent* applies to whatever lies beyond the realm of experience and of knowledge; the transcendent use of concepts is the illegitimate extension of concepts, valid within experience, to what is beyond experience—as the use of the concept of causality with reference to God. This term accordingly has a bad sense. *Transcendental*, on the contrary, is used in a good sense. It is applied to the *a priori* and necessary factors in experience; it accordingly does not go beyond experience, but beyond the empirically given factors of experience.

(3) Transcendent is opposed to immanent. See TRANSCENDENCE (in theology). (This is a connecting link with sense (2). Kant opposes the immanent use of his transcendental principles, remaining within the limits of experience, to the transcendent which goes beyond.) It is particularly used in religious philosophy as defining the relation of God to the world; the transcendent theory (first clearly formulated by Aristotle) holding

to the existence of God external to the universe, the immanent theory holding to the presence of God in the world (cf. PANTHEISM). See Eucken, *Fundamental Concepts*, 92–4; Vaihinger, *Commentar zu Kant*, i. 83–4, 467–76.

According to Prantl (*Gesch. d. Logik*, iii. 245), we owe to a pseudo-Thomas the term *transcendentia* to express the four highest concepts, and also the addition of the two new ones (*res* and *aliquid*), probably under Arabian influence. According to Prantl still further, St. Thomas Aquinas was influenced by the mystic *De Causis*, of Arabian origin, which attempted a Neo-Platonic derivation of the universals. St. Thomas avoided its pantheistic character, however, by giving them a theological cast—*ens* belongs to essence as such, *unum* to the Father, *verum* to the Son, and *bonum* to the Holy Spirit (*Gesch. d. Logik*, iii. 8–9, 114). Before this time the phrase 'transcendental terms' was used of the letters in the syllogistic figures, as signifying 'nothing and everything,' and as being 'without matter.' (J.D.)

Transcendental Realism: see REALISM (2).

Transcendentalism: Ger. *Transscendentalismus*; Fr. *transcendantalisme*; Ital. *trascendentalismo*. (1) The philosophy of the TRANSCENDENTAL (q.v., 2) in the Kantian sense. An explanation of the possibility of an *a priori* knowledge of objects, together with a systematic inventory of the concepts which may thus be applied, and of the principles which result from their application under proper conditions.

(2) Kant's successors attempted (through the elimination or transformation of the Kantian thing-in-itself) to unify the ultimate subject and object of knowledge, and thereby to give complete and not merely phenomenal value to the concepts of absolute or pure thought. This did away with the Kantian distinction of transcendent and transcendental; and transcendentalism comes to mean any theory asserting the dependence of the world upon the activity of reason, provided a systematic attempt is made (as in Fichte's *Wissenschaftslehre* and Hegel's *Logik*) to give a methodic development of reason into the particular categories that constitute the world of experience.

(3) In a loose sense, any philosophy which emphasizes the intuitive, spiritual, and supersensuous; any mode of thought which is aggressively non-empirical or anti-empirical. Thus we hear of the transcendentalism of Emerson, &c. (J.D.)

Transcendentalism (in theology). The doctrine that the source of religious truth is an organ or process of super-ordinary apprehension called variously religious consciousness, mystical insight, or intuition, through which the truth is immediately realized. It is a form of religious MYSTICISM (q.v.).

The typical form of this organ is the intellectual intuition of Schelling, which gives truth, to use a Hegelian phrase, as it were, shot out of a pistol. Historically, the name is used to characterize the religious movement which arose in New England under the leadership of Bronson Alcott, Emerson, and others as a reaction against dogmatic rationalism, and was influenced by both Platonism and German idealism.

Literature: FROTHINGHAM, Transcendentalism in New England; the literature of MYSTICISM. (A.T.O.)

Transeunt: see IMMANENT AND TRANSEUNT ACTIVITY.

Transfigured Realism: see REALISM (2).

Transformation: see MATHEMATICS.

Transformation (in biology) [Lat. *trans* + *forma*, shape]: see TRANSFORMISM.

Transformation (in logic): Ger. and Fr. the same; Ital. *trasformazione*. The change of any statement into an equivalent statement in a different logical form. Such changes as occur in *a is always b* = *every a is b* = *a implies b* = *a is-surely-followed-by b* are changes of expression only, and not of logical form.

Wundt includes under the term transformation immediate inferences in which the new proposition states less than the one from which it is derived, but it is better to call such by a different name, as UNDER-STATEMENT (q.v.). Transformation of propositions is of two sorts: (1) transposition, in which some element of the subject or predicate is changed from one side to the other of the copula, as *Barking dogs do not bite* = *Dogs which bite do not bark*; *Not all a is non-b* = *Not all b is non-a*; or (2) a change in the character of the copula, as *A is the father of B* = *B is the son or daughter of A*; *None but fools cannot see this* = *All are capable of seeing this or are fools*; *No a is b* = *All a is not-b*. See PROPOSITION. Equipollent is the scholastic name for propositions which are logically equivalent.

Obversion is the transformation of a proposition into an equivalent proposition, (1) in which the subject remains the same and

the predicate becomes the contradictory of the original predicate, and (2) in which the copula is changed from positive to negative or the reverse, and also from symmetrical to unsymmetrical or the reverse. (C.L.F.)

Transformation (of energy): see CONSERVATION OF ENERGY, and ENERGY.

Transformism (or theory of **Transformation**) [Lat. *trans* + *forma*, shape]: Ger. *Transformationstheorie*; Fr. *théorie de la transformation, transformisme*; Ital. *teoria del trasformismo*. The theory of biological DESCENT (q. v.), viewed as involving the transformation of earlier into later forms. Cf. EVOLUTION, and NATURAL SELECTION (also for literature). (J.M.B.)

Transgression [Lat. *transgressio*, from *transgredi*, to pass over]: Ger. *Verbrechen*; Fr. *transgression*; Ital. *trasgressione*. In theology, transgression is identical with active sin, and consists in violating, disregarding, or ignoring the authoritative divine law as expressed in conscience or the written word. See SIN (also for literature). (A.T.O.)

Transient [Lat. *trans* + *ire*, to go]: Ger. *transgredient*; Fr. (2) *transitif*; Ital. (2) *transeunte*. (1) Transient, in its earlier use, is the equivalent of the post-Kantian term TRANSCENDENT (q. v.), as opposed to immanent.

(2) As applied to activity or causes, see reference under TRANSEUNT.

Aristotle distinguished πράττειν (doing) from ποιεῖν (making), the former denoting an activity expended upon itself, the latter upon bringing into effect some modification of an external existence. Conduct fell into the former sphere, art into the latter. The scholastics regularly distinguished between *causa* or *actio transiens* and *causa* or *actio immanens*. Thus St. Thomas Aquinas says *actio* is twofold; *transiens*, which goes forth into external material (to heat, to dry), and that which remains in the agent, as thinking, feeling, willing. See Eucken, *Grundbegriffe der Gegenwart*, 292 and note. (J.D.)

Transilient (variation and evolution): see NATURAL SELECTION, passim, and cf. MUTATION, and VARIATION (in biology).

Translation [Lat. *trans* + *latum*, part. of *ferre*, to bear, carry]: Ger. *Uebersetzung*; Fr. *traduction* (*transposition*); Ital. *traduzione*. (1) In the literal sense, the rendering of one language into another.

(2) The statement of one subject in terms of another; the transference of a given line of argument from one sphere to another; the use of one set of facts to describe another set, e. g. an essay in physics or physiology may be experimentally 'translated' into aesthetics or ethics, a statement of biological into a statement of economic fact.

'"Mrs. Carnac" is the subject of one of the best and most highly prized of the mezzotints made under Sir Joshua's eye; it is interesting to learn that the pendant of this picture, Gainsborough's miraculous "Mrs. Robinson," has just been *translated* in the same medium by one of the most accomplished of the modern revivers of the art, Mr. Gerald Robinson, president of the Society of Mezzotint Engravers' (*The Times*, London, June 23, 1900). 'Lord Rosebery, as we have said, displays in a marked degree what may be called a theoretical knowledge of Imperial conditions. If he feels within himself the capacity and the energy to *translate* the knowledge into a practical programme, the way is plain before him' (*Times*, London, Nov. 19, 1900). Cf. SIGNIFICS. (V.W.)

Transmigration of Souls: see METEMPSYCHOSIS.

Transmission [Lat. *trans* + *mittere*, to send]: Ger. (1) *Ueberlieferung*, (2) *Fortpflanzung*; Fr. *transmission*; Ital. *trasmissione* (see also the equivalents for HEREDITY). (1) Social: the handing down from one generation to another of the material of TRADITION (q. v., in biology and sociology).

(2) Biological: (*a*) physical HEREDITY (q. v.), i. e. the inheritance of specific, or definite, characters; (*b*) the passage from parent to child by physical reproduction of the effects, not themselves specific or definite, of those conditions of life which modify the germ-cells of one or both parents, e. g. the effects of alcoholic poisoning upon subsequent generations.

For the distinction between (*a*) and (*b*) under definition (2), see HEREDITY. It is highly important in connection with the theory of Lamarckian inheritance. Only the form of transmission (*a*) is true heredity. In contrast with the transmission of general effects it has been called 'definite' transmission (see Ewart, Pres. Address, *Nature*, Sept. 12, 1901). The other case (*b*)—the appearance in the offspring of effects due to the influence of the parents' conditions of life—may well be called 'indefinite' transmission. The former is the transmission of characters, the latter the transmission of conditions or effects.

The phenomena of social transmission have long been recognized in the historical sciences. The attempt in recent years to found socio-

logy upon biology has raised the question of the relation of the facts of transmission in the two provinces respectively to each other. It is now seen, however, that the transmission of social material is by psychological processes, such as IMITATION (q. v.), &c., and that this differs essentially from that of biological heredity (cf. GALTON'S LAW, of ancestral inheritance, and REGRESSION).

Literature: WEISMANN, Germ-Plasm, and Studies in Heredity; recent expositions of EVOLUTION (q. v.). The literature of ORGANIC SELECTION, e.g., LL. MORGAN, Habit and Instinct; BALDWIN, Development and Evolution (1902); in both of which the relation of the two forms of transmission to each other is discussed. (J.M.B., E.B.P., C.LL.M.)

Transmission (in neurology): see Conduction under NERVE STIMULATION AND CONDUCTION.

Transmission (in theology and philology). Handing down by oral TRADITION (q. v.) as contrasted with written records. (J.M.B.)

Transposition (in logic) [Lat. *trans*+*ponere*, to place]: Ger. *Hinüberschaffen*; Fr. *transposition*; Ital. *trasposizione*. Transposition consists in transferring a term from the subject to the predicate, or the reverse, with no change in the character of the connection; as, *No artists who are bankers are clever, No artists are clever bankers, No bankers are clever artists, None are at once artists and bankers and clever*; or as *All but a is b, All but b is a*. Any proposition may be 'transformed' into other exactly equivalent forms: e.g. the transformation may consist in the change from one sort of connection to another (change of copula, in the extended meaning of that term), as—to take a compound proposition as an example —*It never rains but it pours = always either it pours or it does not rain*, but this is not transposition.

Certain copulas permit transposition simply, with no variation in the quality of the term transposed (as in the instances just given); but with the non-symmetrical copulas (see PROPOSITION) there must be a change from positive to negative or the reverse (and, if the proposition is complex, from the conjunctive to the alternative combination and the reverse), if the change can be made at all: He who is an astronomer *and* un-devout is mad = Any astronomer is mad *or* devout = All are mad *or* devout *or* not astronomers. When both the whole subject and the whole predicate is transposed the change is commonly called contraposition if the copula is non-symmetrical (*All a is b = All non-b is non-a*; *None but a is b = None but non-b is non-a*), but simple conversion if it is symmetrical (*No a is b = No b is a, Some a is b = Some b is a*). The usual discussion in the logics of the doctrine of the equivalence of propositions is greatly simplified by taking this more general view of the subject (see PROPOSITION).

(C.L.F., C.S.P.)

Trans-subjective (the): Ger. (*das*) *Transsubjektive* (Volkelt); Fr. (*le*) *transsubjectif*; Ital. (*il*) *transubbiettivo*. The objective considered as having reality independent of its apprehension by a subject.

It is used, however, in connection with knowledge, which is said to have a trans-subjective reference, or to demand a 'realm of the trans-subjective.' As used by Volkelt (*Erfahrung u. Denken*, 42), all is trans-subjective 'was ausserhalb meines eigenen Bewusstseins Vorgänge geben mag' (quoted by Eisler). (J.M.B.)

Transubstantiation [Lat. *transubstantiatio*, from *transubstantiare*, to change into another]: Ger. *Transubstantiation*; Fr. *transsubstantiation*; Ital. *transustanziazione*. In Catholic theology, the change of the elements in the Sacrament of the Eucharist, through the act of consecration, into the real body and blood of Christ.

It is to be distinguished from consubstantiation, the doctrine of the coexistence of Christ's body and blood with the elements which remain unchanged; from the doctrine of impanation or subpanation, that the body and blood are in or under the elements; also from all theories of the spiritual presence merely, i. e. as not involving the actual conversion of the elements. The doctrine, first broached by some of the Greek Fathers, was a question of debate during the middle ages, although held by the principal schoolmen. It was formally confirmed by the Lateran Council, 1225, the Council of Trent, 1551, and has since that time been the authoritative belief of the Roman Catholic Church.

Literature: WISEMAN, Lects. on the Holy Eucharist. (A.T.O.)

Traumatism [Gr. τραῦμα, a wound]: Ger. *Traumatismus*; Fr. *traumatisme*; Ital. *traumatismo*. A diseased condition produced by a wound, or by external violence. (C.F.H.)

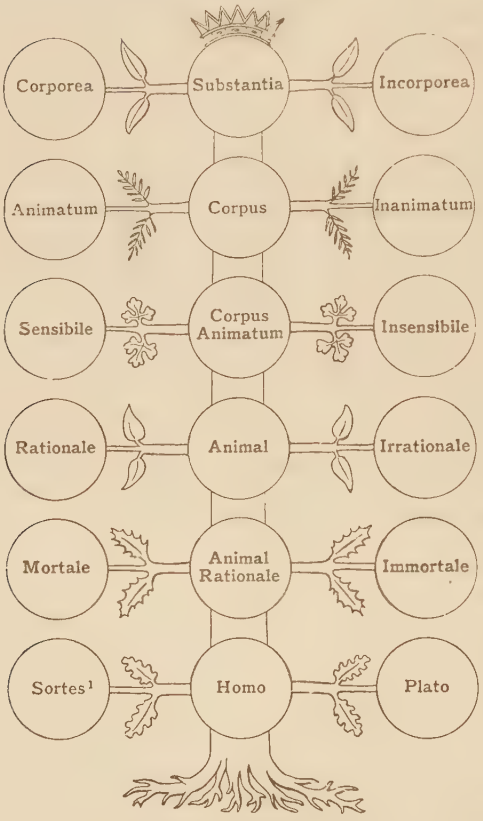
Traumatrope: see ILLUSIONS OF MOTION AND MOVEMENT (1).

Treason: see HIGH TREASON.

Tree of Porphyry: Ger. *Baum des Por-*

phyrius; Fr. *arbre de Porphyre*; Ital. *scala ternaria di Porferio* (E.M.). The name given to the figure of a tree which appears in all the old logics.

It is supposed to illustrate the second chapter of the Isagoge of Porphyry, showing the genera on the trunk of the tree, and the specific differences on the branches, with substance at the top; cf. the figure for an outline.



It is also sometimes called and figured as a ladder, *κλῖμαξ*, *scala praedicamentalis*, *Jacobsleiter*, &c. (C.S.P.)

[1] 'Sortes' is the name universally employed in mediaeval logics as the example of an individual. It grew, no doubt, from an abbreviated spelling of Socrates. But it was pronounced as well as spelled Sortes, and had no connection, in the minds of those who disputed about logic, with the historical Socrates. Indeed, for generations, during the time in which it was in use, only the very learned knew anything about Socrates. One gloss, attributed to the famous Scotus Erigena, in explaining a statement that Socrates was killed by hellebore, narrates, for the information of those less erudite, that Socrates and Hellebore were two Greek philosophers, who became so warm in a logical dispute that the former fell a victim to the fury of the latter.

Tree Structure: see DENDRITE.

Tremor [Lat. *tremor*, a shaking]: Ger. *Tremor*, *Zittern*; Fr. *tremblement*; Ital. *tremore*. A continuous spasm of limited range.

Tremor may be physiological, as in shivering and chattering from cold, or the trembling from fear, and hardly passes the bounds of the normal in the ordinary tremors accompanying old age. In tremor of mental origin there seems to be a loss of the controlling power of the motor centres; and many abnormal tremors regularly become more marked under excitement, embarrassment, fear, and other mental disturbances. Tremors are usually symptomatic of abnormal nervous conditions; and as such the precise variety and progress of the tremor become of considerable diagnostic value. Tremors are characteristic of the effects of poisons, such as alcohol, mercury, lead, opium, &c. (see ALCOHOLISM). In paralysis agitans (see PARALYSIS) the tremor is most significant, and its changes mark the stages of the disease; in CHOREA, in general PARALYSIS, in HYSTERIA, &c., tremors are also important diagnostic symptoms (cf. these terms, and also MOVEMENT, disorders of). (J.J.)

Trendelenburg, Friedrich Adolf. (1802–72.) Born at Eutin, he studied philology and philosophy at Kiel, Leipzig, and Berlin. Private tutor in the family of Postmaster-General von Nagler, 1826–33; professor extraordinary at Berlin, 1833; professor ordinary there, 1837; member (1846) of the Berlin Academy and secretary (1847–72) of the 'historico-philosophical' section. He was made Knight of the Order of Merit on the day of his death.

Trephine [Gr. *τρύπανον*, an auger, a borer]: Ger. *kleiner Schädelbohrer*; Fr. *tréphine*; Ital. *trapano*. (1) A cylindrical hand-saw, generally provided with removable centre-pin, for removing a circular disk or button from the skull.

(2) Verb: to open the skull with a trephine. (C.F.H.)

Triad [Gr. *τριάς*, the number three]: Ger. *Dreiklang*; Fr. *accord* (*de trois sons*), *accord parfait* (c, e, g); Ital. *triõ*. A chord of three tones, simple or compound.

The major triad c-e-g (major third + minor third) and the minor triad c-e♭-g (minor third + major third) are the bases of all other major and minor chords respectively.

Literature: HELMHOLTZ, Sensations of Tone (Eng. trans.), 212. (E.B.T.)

Tribal Self: Ger. *Stammes-*(*Volks-*)*seele*,

Gesammtpersönlichkeit (Wundt); Fr. *conscience sociale, moi tribal*; Ital. *Io tribole* (or *soziale*). The psychological factors involved in the organization of a social group (tribe), when conceived, after analogy with the individual's mental organization, in the form of a personal self.

The conception is often vague, and stands upon much the same plane as that of GENERAL (or Social) WILL (q.v.). (J.M.B., F.H.G.)

Tribe [Lat. *tribus*, a third part]: Ger. *Stamm*; Fr. *tribu*; Ital. *tribù*. (1) One of the three divisions of the Roman people recognized at the beginning of their recorded history.

(2) An organized group or band of persons, usually compound, the component groups being allied hordes or related clans, and all speaking a common language or dialect.

A tribe is essentially a military organization, and usually has a military council and a chief. It should not be confounded with a CLAN (q.v.), which is essentially a juridical organization.

The word tribe has equivalents in all languages except those of the lowest hordes, and tribes have been loosely described in all ancient and mediaeval literatures; but the scientific description and definition (2) were first made by Lewis H. Morgan, *The League of the Iroquois* (1849), *Systems of Consanguinity and Affinity* (1871), and *Ancient Society* (1877). (F.H.G.)

Tribunal (legal): see COURT.

Trichotomy (in theology) [Gr. *τρίχα*, in three, + *ταμεῖν*, to divide]: Ger. *Dreitheilung*; Fr. *trichotomie*; Ital. *tricotomia*. The threefold distinction of the nature of man into body (soma), soul (psyche), and spirit (pneuma).

This view has its germ in the New Testament, in such passages as 1 Thess. v. 23. It was advocated by Origen and opposed by Augustine and Tertullian, who held the dichotomic view. The distinction has survived to the present day, the trichotomic doctrine finding its principal exponents among German theologians, while its chief opponents are found among English divines.

Literature: DELITZSCH and PECK, Bib. Psychol.; J. B. HEARD, The Tripartite Nature of Man (1870); the literature of PSYCHOLOGY (biblical). (A.T.O.)

Trilemma [Gr. *τρεῖς*, three, + *λῆμμα*, something taken]: Ger. *Trilemma*; Fr. *trilemme*; Ital. *trilemma*. A SYLLOGISM (q.v.) with three conditional propositions, the major premises of which are disjunctively affirmed in the minor (*Cent. Dict.*). Cf. DILEMMA. (C.S.P.)

Trinitarianism [Lat. *trinitas*, from *trinus*, threefold]: Ger. *Dreieinigkeitslehre*; Fr. *trinitarisme*; Ital. *trinitarianismo*. That doctrine of the divine nature which represents the Godhead as combining tripersonality with unity of individual substance and being.

The Trinitarian conception, which received its first authoritative statement in the Athanasian Creed, has its germ in the New Testament, which ascribes divine functions to Father, Son, and Spirit. The necessity arose of reconciling this plurality with the essential unity of the Godhead so as to avoid polytheism. The fierce controversy between Arians and Trinitarians ended in the triumph of the latter and the adoption of the Trinity as the central dogma of the Christian faith, a position which it has historically maintained.

Literature: LIDERER, Christl. Dogmatik (1849); BAUER, Die christl. Lehre v. d. Dreieinigkeit; SHEDD, Defence of Nicene Creed; HODGE, Hist. of Christ. Doctrine; O. OSTERZEE, Christ. Dogmatics (1841–3); DORNER, Syst. of Christ. Belief. (A.T.O.)

Trinity: Ger. *Dreieinigkeit*; Fr. *Trinité*; Ital. *Trinità*. The Deity as represented in Nicene theology, including three personalities, Father, Son, and Holy Spirit, in one essentially unitary substance. The doctrine is often called that of 'tripersonality.'

For discussion and literature see TRINITARIANISM, ARIANISM, and ATHANASIAN CREED. (A.T.O.)

Tripersonality: see TRINITY.

Tritheism (in theology) [Gr. *τρεῖς*, three, + *θεός*, God]: Ger. *Tritheismus*; Fr. *trithéisme*; Ital. *treteismo*. A conception of the TRINITY (q.v.), which virtually represented the Father, Son, and Spirit as three distinct individuals, predicating distinction of substance as well as of personal manifestation.

This view arose as a polytheistic reaction against extreme monotheistic tendencies. It originated in Alexandria in the 6th century, and was championed by Philoponeius, Conon of Tarsus, Eugenius of Seleucia, and others. Later the party appeared in Constantinople, where a disputation was held between its representatives and the Patriarch John. The tendency has practically disappeared from later Christian thought.

Literature: see TRINITARIANISM. (A.T.O.)

Triune God [Lat. *tres*, three, + *unus*, one: three in one]: Ger. *der dreieinige Gott*; Fr. *le Dieu en trois personnes*; Ital. *Dio uno*

e trino. An appellation of God employed in Trinitarian theology, used to express the tri-personality of the one divine substance. See TRINITARIANISM (also for literature). (A.T.O.)

Trivium [Lat. a cross-road, public square; in scholastic Latin the three arts of grammar, logic, rhetoric]. A term used throughout the scholastic period (for example, by Dante) for the three arts, grammar, logic, and rhetoric. Cf. PHILOSOPHY, passim. (C.S.P.)

Trophism [Gr. τροφή, nourishment]: Ger. *trophische Funktion*; Fr. *influence trophique*; Ital. *trofismo.* That power or control which the nervous system exercises over growth and metabolism in various parts of the body. The term trophic nerves was first used by Samuel.

Permanent changes are produced in the structure of the body by changes in or suppression of the nervous influence. Such are atrophy, aplasy, hypertrophy, hyperplasy, paraplasy, and various neuropathies. The classical experiment is the section of the ischiatic nerve, which not only produces paralysis of the leg, but is followed by swelling, inflammation, and spontaneous ulceration and decubitus. At the same time an irritable zone develops upon the neck, the mere touch of which is sufficient to bring on an attack of epilepsy (in rodents).

The effects of nervous weakness or excitement upon the hair and skin, and a long list of diseases of neurotic origin, illustrate the perversions of trophic action (erythema, erysipelas, urticaria, herpes, prurigo, eczema, pemphigus, pityriasis, acne, furunculi, &c.). Even embryonic development seems to be largely under nervous control, at least in later stages. The power of self-repair is lost upon the section of the nerve supplying a muscle.

Gaule reports that he has been able to produce within five or ten minutes a localized sore on the surface of the exposed biceps by electrically irritating the corresponding spinal ganglion. These and other facts discredit the idea of special trophic nerves, but accrue to the theory that all nerves are trophic in their action upon the part which they innervate. Cf. END-ORGAN.

Literature: ARNDT, Über trophische Nerven, Arch. f. Anat. u. Physiol. (1891); J. GAULE, Deutsch. med. Wochensch., xx (1894); trans. of same, in Brain, xvii (1894); and Congrès Int. d. Sci. Méd., Arch. Ital. de Biol., xxii (1895); SCHIFF, Deutsch. med. Wochensch. (1888); VIRCHOW, Handb. d. speciellen Pathol. u. Therapie (1854). (H.H.)

Tropism [Gr. τρέπειν, to turn]: Ger. *Tropismus*; Fr. *tropisme*; Ital. *tropismo.* The property possessed by certain organisms (plants), or their organs, of turning, in whole or part, towards a source of stimulation in the environment, as towards the sun (heliotropism), towards the earth (geotropism), &c.

It is often used in compounds. On certain of the tropisms and the terminology of the subject see Roux, *Arch. f. Entwicklungsmech. d. Organismen*, viii. 2 (1899), 355. (J.M.B., E.B.P.)

Trust: see FAITH, and RELIGION (psychology of, 'dependence').

Trust (corporate) [ME. *trust* and *trist*]: Ger. *Verband*; Fr. *syndicat*, (3) '*trust*'; Ital. *sindacato.* (1) A device by which stockholders put their shares in the hands of trustees, to secure permanence of management.

(2) The practice of putting shares of companies which might compete into the hands of the same trustees, so as to secure harmony of action.

(3) Any device for the permanent restriction of competition. This is the current sense of the word to-day.

A trust differs from a pool chiefly in the element of permanence. A pool is a contract, and being in restraint of trade, has in America little or no legal sanction. It is therefore precarious. A trust agreement is in the nature of things permanent until the trust itself is dissolved. But the legislation against trusts has in recent years so far endangered their existence that it is difficult to find in America any means of permanently restraining competition, or even the abuses of competition, short of actual consolidation. (A.T.H.)

Truth and **Falsity** (1) and (2) **Error** [AS. *treowth*, Lat. *falsus*, false, and *error*, wandering]: Ger. (1) *Wahrheit und Falschheit*, (2) *Irrthum*; Fr. (1) *vérité et fausseté*, (2) *erreur*; Ital. (1) *verità e falsità*, (2) *errore.* 'Truth' and 'falsehood' are used in two main senses, according as (*a*) our belief in some proposition, (*b*) the proposition which we believe, is said to be true or false. True and false belief may be defined, respectively, as belief in propositions which are true or false: and *error* denotes false belief. Further, true and false propositions may be called, respectively, *truths* and *errors.* *Falsehood*, however, or *falsity*, and not error, is used to denote that property of a false proposition in virtue of possessing which it is called an error.

'True' and 'false,' as applied to proposi-

tions, denote properties attaching to propositions which are related to one another in such a way that every proposition must be either true or false, and that to every true proposition there corresponds a false one, and to every false proposition a true one, differing from it only as being its negation. There are, properly speaking, no degrees of truth or falsehood, but one error may be said to be truer or more erroneous than another, according as a greater or smaller number of the propositions it implies are true.

The following proposed definitions call for notice, both because of their wide acceptance, and because a notice of them will serve to isolate the properties which the terms really denote.

(1) It is commonly supposed that the truth of a proposition consists in some relation which it bears to reality; and falsehood in the absence of this relation. The relation in question is generally called a 'correspondence' or 'agreement,' and it seems to be generally conceived as one of partial similarity; but it is to be noted that only propositions can be said to be true in virtue of their partial similarity to something else, and hence that it is essential to the theory that a truth should differ in some specific way from the reality, in relation to which its truth is to consist, in every case except that in which the reality is itself a proposition. It is the impossibility of finding any such difference between a truth and the reality to which it is supposed to correspond which refutes the theory. For:—

(*a*) It is now generally agreed that the difference does not consist in the fact that the proposition is a mere grammatical sentence or collection of words; but that the popular sense, in which a *statement* may be said to be true or false, is merely derived from that in which what it signifies may be so.

(*b*) It is, however, generally held that the difference consists in the fact that the proposition is a *mental* copy of the reality, or an 'idea.' This view seems to be solely due to the almost universal error, whereby the *object* of a belief or idea is regarded as the attribute or content of such belief or idea; an error which is refuted by the fact that it denies the existence of that unique relation which we mean by knowing, and is therefore never consistently held: e.g. those who hold this view must, in consistency, deny any difference between those senses of truth in which it is applied to a belief and to the object of such belief—a difference which in practice they cannot fail to recognize; for no one ever consistently held that when two persons are said to know the same truth, all that can be meant is that their states of mind are similar.

(*c*) No other difference has ever been proposed; and, indeed, once it is definitely recognized that the proposition is to denote, not a belief or form of words, but an *object* of belief, it seems plain that a truth differs in no respect from the reality to which it was supposed merely to correspond: e.g. the truth that I exist differs in no respect from the corresponding reality—my existence. So far, indeed, from truth being defined by reference to reality, reality can only be defined by reference to truth: for truth denotes exactly that property of the complex formed by two entities and their relation, in virtue of which, if the entity predicated be existence, we call the complex real—the property, namely, expressed by saying that the relation in question does truly or really hold between the entities. [Cf. the section *Psychological*, below, which states somewhat similar reasons for rejecting the 'correspondence' view. In the following, '*Logical*,' section, however, the 'correspondence' view is presented.—J.M.B.]

(2) It seems to be frequently implied that the truth of a proposition may consist in its relation to other propositions—in the fact that it 'fits into a system.' This view, however, simply neglects the admitted fact that any logical relations which hold between a set of true propositions will also hold between a set of false ones; i.e. that the only kind of system into which a true proposition will fit, and a false one will not, is a system of true propositions. The view derives its plausibility merely from the fact that the systems of propositions considered are ones to which we are so thoroughly accustomed that we are apt to regard their contradictories as not merely false but self-contradictory.

The Greek and Latin equivalents for 'true' and 'false' are respectively *ἀληθής*, *verus*; *ψευδής*, *falsus*. Error has the equivalents *ἁμαρτία* or *ἁμάρτημα*, and *error*; but 'falsehood' as distinguished from 'error,' i.e. as denoting the property of a false proposition, has no corresponding abstract noun in Greek nor in classical Latin. There is, properly speaking, no history of the terms, since they have always been used in philosophy and always in very much the same senses. That truth consists

in some relation of words to what they signify, or even to one another, has indeed been seriously held at various times; and the fact that it seems scarcely necessary any longer to discuss that view, perhaps marks some progress in the conception of the terms. The view that truth consists in relation to a system owes its vogue to Kant's theory of experience, which appears to make the objectivity of a judgment consist in the fact that its subject is related to other subjects, and does not clearly distinguish objectivity from truth. It should, perhaps, be noted that error or false belief has been frequently held to consist, not in consciousness of something different from the truth, but merely in absence of consciousness of the truth or of the whole truth—a view which naturally follows as one of the alternative inferences from the premise that false = not-true, and from the premise that consciousness of the truth = true consciousness. (G.E.M.)

Logical. (1) Truth is a character which attaches to an abstract proposition, such as a person might utter. It essentially depends upon that proposition's not professing to be exactly true. But we hope that in the progress of science its error will indefinitely diminish, just as the error of 3·14159, the value given for π, will indefinitely diminish as the calculation is carried to more and more places of decimals. What we call π is an ideal limit to which no numerical expression can be perfectly true. If our hope is vain; if in respect to some question—say that of the freedom of the will—no matter how long the discussion goes on, no matter how scientific our methods may become, there never will be a time when we can fully satisfy ourselves either that the question has no meaning, or that one answer or the other explains the facts, then in regard to that question there certainly is no *truth*. But whether or not there would be perhaps any *reality* is a question for the metaphysician, not the logician. Even if the metaphysician decides that where there is no truth there is no reality, still the distinction between the character of truth and the character of reality is plain and definable. Truth is that concordance of an abstract statement with the ideal limit towards which endless investigation would tend to bring scientific belief, which concordance the abstract statement may possess by virtue of the confession of its inaccuracy and one-sidedness, and this confession is an essential ingredient of truth. A further explanation of what this concordance consists in will be given below. Reality is that mode of being by virtue of which the real thing is as it is, irrespectively of what any mind or any definite collection of minds may represent it to be. The truth of the proposition that Caesar crossed the Rubicon consists in the fact that the further we push our archaeological and other studies, the more strongly will that conclusion force itself on our minds for ever—or would do so, if study were to go on for ever. An idealist metaphysician may hold that therein also lies the whole *reality* behind the proposition; for though men may for a time persuade themselves that Caesar did *not* cross the Rubicon, and may contrive to render this belief universal for any number of generations, yet ultimately research—if it be persisted in—must bring back the contrary belief. But in holding that doctrine, the idealist necessarily draws the distinction between truth and reality. [Cf., however, the section *Psychological*, below.—J.M.B.]

In the above we have considered positive scientific truth. But the same definitions equally hold in the normative sciences. If a moralist describes an ideal as the *summum bonum*, in the first place, the perfect truth of his statement requires that it should involve the confession that the perfect doctrine can neither be stated nor conceived. If, with that allowance, the future development of man's moral nature will only lead to a firmer satisfaction with the described ideal, the doctrine is true. A metaphysician may hold that the fact that the ideal thus forces itself upon the mind, so that minds in their development cannot fail to come to accept it, argues that the ideal is *real*: he may even hold that that fact (if it be one) constitutes a *reality*. But the two ideas, *truth* and *reality*, are distinguished here by the same characters given in the above definitions.

These characters equally apply to pure mathematics. Projective geometry is not pure mathematics, unless it be recognized that whatever is said of rays holds good of every family of curves of which there is one and one only through any two points, and any two of which have a point in common. But even then it is not pure mathematics until for points we put any complete determinations of any two-dimensional continuum. Nor will that be enough. A proposition is not a statement of perfectly pure mathematics until it is devoid of all definite meaning, and comes to this—that a property of a certain icon is

pointed out and is declared to belong to anything like it, of which instances are given. The perfect truth cannot be stated, except in the sense that it confesses its imperfection. The pure mathematician deals exclusively with hypotheses. Whether or not there is any corresponding real thing, he does not care. His hypotheses are creatures of his own imagination; but he discovers in them relations which surprise him sometimes. A metaphysician may hold that this very forcing upon the mathematician's acceptance of propositions for which he was not prepared, proves, or even constitutes, a mode of being independent of the mathematician's thought, and so a *reality*. But whether there is any reality or not, the truth of the pure mathematical proposition is constituted by the impossibility of ever finding a case in which it fails. This, however, is only possible if we confess the impossibility of precisely defining it.

The same definitions hold for the propositions of practical life. A man buys a bay horse, under a warranty that he is sound and free from vice. He brings him home and finds he is dyed, his real colour being undesirable. He complains of false representations; but the seller replies, 'I never pretended to state every fact about the horse; what I said was true, so far as it professed to be true.' In ordinary life all our statements, it is well understood, are, in the main, rough approximations to what we mean to convey. A tone or gesture is often the most definite part of what is said. Even with regard to perceptual facts, or the immediate judgments we make concerning our single percepts, the same distinction is plain. The percept is the reality. It is not in propositional form. But the most immediate judgment concerning it is abstract. It is therefore essentially unlike the reality, although it must be accepted as true to that reality. Its truth consists in the fact that it is impossible to correct it, and in the fact that it only professes to consider one aspect of the percept.

But even if it were impossible to distinguish between truth and reality, that would not in the least prevent our defining what it is that truth consists in. Truth and falsity are characters confined to propositions. A proposition is a sign which separately indicates its object. Thus, a portrait with the name of the original below it is a proposition. It asserts that if anybody looks at it, he can form a reasonably correct idea of how the original looked. A sign is only a sign *in actu* by virtue of its receiving an interpretation, that is, by virtue of its determining another sign of the same object. This is as true of mental judgments as it is of external signs. To say that a proposition is true is to say that every interpretation of it is true. Two propositions are equivalent when either might have been an interpretant of the other. This equivalence, like others, is by an act of abstraction (in the sense in which forming an abstract noun is abstraction) conceived as identity. And we speak of believing in a proposition, having in mind an entire collection of equivalent propositions with their partial interpretants. Thus, two persons are said to have the same proposition in mind. The interpretant of a proposition is itself a proposition. Any necessary inference from a proposition is an interpretant of it. When we speak of truth and falsity, we refer to the possibility of the proposition being refuted; and this refutation (roughly speaking) takes place in but one way. Namely, an interpretant of the proposition would, if believed, produce the expectation of a certain description of percept on a certain occasion. The occasion arrives: the percept forced upon us is different. This constitutes the falsity of every proposition of which the disappointing prediction was the interpretant.

Thus, a false proposition is a proposition of which some interpretant represents that, on an occasion which it indicates, a percept will have a certain character, while the immediate perceptual judgment on that occasion is that the percept has not that character. A true proposition is a proposition belief in which would never lead to such disappointment so long as the proposition is not understood otherwise than it was intended.

All the above relates to *complex truth*, or the truth of propositions. This is divided into many varieties, among which may be mentioned *ethical truth*, or the conformity of an assertion to the speaker's or writer's belief, otherwise called *veracity*, and *logical truth*, that is, the concordance of a proposition with reality, in such way as is above defined.

(2) The word *truth* has also had great importance in philosophy in widely different senses, in which it is distinguished as *simple truth*, which is that truth which inheres in other subjects than propositions.

Plato in the *Cratylus* (385 B) maintains that words have truth; and some of the scholastics admitted that an incomplex sign, such as a picture, may have truth.

But *truth* is also used in senses in which it is not an affection of a sign, but of things as things. Such truth is called *transcendental truth*. The scholastic maxim was *Ens est unum, verum, bonum*. Among the senses in which transcendental truth was spoken of was that in which it was said that all science has for its object the investigation of *truth*, that is to say, of the real characters of things. It was, in other senses, regarded as a subject of metaphysics exclusively. It is sometimes defined so as to be indistinguishable from reality, or real existence. Another common definition is that truth is the conformity, or conformability, of things to reason. Another definition is that truth is the conformity of things to their essential principles.

(3) *Truth* is also used in logic in a sense in which it inheres only in subjects more complex than propositions. Such is *formal truth*, which belongs to an argumentation which conforms to logical laws. (C.S.P.)

Psychological. The psychological criticism of the notion of reality seems to be reducing it to that of truth, and in so far to be making it difficult to put the 'correspondence' theory of truth in any tenable form. If in its essential, no less than in its genetic, meaning reality = is that which consciousness somewhere and somehow finds it possible to believe or accept as true, then it is a vicious circle to define truth as that which corresponds to or that which approximates to reality. The reality-coefficient, it seems safe to say, can be attached to this or that mental content only through the acceptance of the latter by consciousness for practical or other purposes; and when we come to ask for something which can be considered the irreducible character of truth, we find it to be, so far as the conscious recognition of it is concerned, also its acceptance for practical or other purposes. The fundamental difficulty with a 'correspondence theory' is this: it assumes a reality with which that which claims to be true may be compared, in order to find out whether it really be true or not. This is to say that we have a system of realities which have not been derived through the processes of selection in which alone just those tests arise which constitute them truths. Genetic analysis shows that by our active accommodations to whatever there is to accommodate to we select out bits of workable experience, hypostatize them under the name of reality, and thus, through gradual accretion to the store—both the individual and the racial store—we enlarge the range of truth with the reflection of it *pari passu* which constitutes reality. It would then be necessary to say, as the present writer (*Psychol. Rev.*, Jan., 1898, 1 ff.) has said in common with a German writer (Simmel, *Arch. f. syst. Philos.*, i. 34 ff.): 'truth is not selected because it is true (to reality): it is true because it has been selected.' And it might be said with equal justification: reality is not that to which truth must correspond; truth, on the contrary, is that to which reality must correspond.

The genetic reasons for the common-sense view—and also for the logical view (see above, *Logical*)—that goes by the term 'correspondence' appear to be plain. By the historical growth of tradition, authority, science, &c., and by the reflection of great standard formulations in the congenital equipment of individuals, a system of realities is recognized into which all are educated and to which all minor statements and beliefs are made to conform. This body of established truths has certain characters—permanency, consistency, compelling quality, &c.—which in our hypostatizing of reality come to be criteria of truth. According as new formulations, items, reported facts stand tests by these criteria, they are brought into correspondence with the reality of which such tests are functions; so that they are said to be, and they are able to remain, *true*. In so far, therefore, the correspondence view has grounds to rest upon, and in this sense it applies to a very wide series of cases. But it still remains that, if these considerations be true to psychology, for purposes of definition, truth is the ultimate and reality the derived term.

Literature: that of EPISTEMOLOGY, and LOGIC; BIBLIOG. B, 1, *d*, and C, 2, *g*; citations under SELECTIVE THINKING. (J.M.B., C.L.F.)

Truth (in theology): Ger. *Wahrheit*; Fr. *vérité*; Ital. *verità* (*di Dio*, &c.—E.M.). Truth as a divine attribute is to be understood as the exact correspondence between the divine thought and reality; or the exact correspondence between the divine promise and its fulfilment. Cf. ATTRIBUTE (of God).

The former constitutes God's thought the ultimate ground and criterion of truth, while the latter constitutes his word the ultimate standard of faithfulness. (A.T.O.)

Tschirnhausen, Graf von, Walther Ehrenfried, Herr von Kisslingswalde und Stolzenberg. (1651–1708.) Studied at Leyden, chiefly mathematics. Volunteer in Holland, where he met Huyghens and became

familiar with Cartesianism. Became acquainted, later, with Spinoza. Journeyed to England, to Italy, to Vienna, and for a second time to France, where he became member of the Academy. After 1695 he lived at his castle, ground lenses, made chemical experiments, and died deeply regretted by Leibnitz.

Tucker, Abraham. (1705–74.) Born in London, and educated at Merton College, Oxford. He entered the Inner Temple, but retired to private life at Betchworth, where he died.

Twofold Truth (doctrine of the): see SCHOLASTICISM, II (1).

Tychism [Gr. *τύχη*, chance]: not in use in the other languages. A term introduced by C. S. Peirce to denote the theories which give to chance an objective existence in the universe, instead of regarding it as due to our lack of knowledge; a theory which gives both chance and necessity share in the process of evolution.

'The mere proposition that absolute chance . . . is operative in the cosmos may receive the name of Tychism.' Evolution by fortuitous variation he calls tychasm, and the theory that regards this as of principal importance tychasticism (*Monist*, iii. 188). The term appears to be first used (ibid. ii. 533) as follows: 'I endeavoured to show what ideas ought to form the warp of a system of philosophy, and particularly emphasized that of absolute chance. In the number for April, 1892, I argued further in favour of that way of thinking, which it will be convenient to christen *tychism* (from *τύχη*, chance).' (J.D.)

Type (in biology) [Gr. *τύπος*, a print, impression]: Ger. *Typus*; Fr. *type*; Ital. *tipo*. (1) The central form about which the VARIATIONS (q. v.) centre.

(2) In systematic botany and zoology: the individual specimen upon which the first description of a species is based.

The modern idea of type is essentially statistical. It was first established by Quetelet (*Anthropométrie*) and has been greatly developed by Francis Galton. For a discussion of the statistical type as applied to species see C. B. Davenport, in *Science*, vii. 685, and xiv. 315; also *Statistical Methods* (1900). (C.S.M.)

The older philosophical conception of type, which meaning (1) above puts into mathematical form, is that of a perfect or universal example or *ἰδέα*, to which particular instances more or less fully approximate. This existed either as a pattern in the creator's mind or as an immanent teleological principle. Agassiz, among naturalists, made the type a 'divine thought.' Cf. ARCHETYPE (with citations).

Literature: PLATO, Rep., 379, 380 c, 388 b; ARISTOTLE, De An., II. i. 413 a 9. (J.M.B.)

Type and **Typical** (in aesthetics). A concrete embodiment or exemplification of a characteristic quality.

Usually, the embodiment of a quality conceived to be characteristic of a species or group; hence, the ideal representative of a species or group. So the Greek gods as represented in sculpture were types of the various qualities characteristic of the Greek ideal world of intelligence and order.

The formation of a type by an artist (or people) may take any one of three methods: (1) the accidental may be neglected and only the central emphasized; or (2) this may be pushed further and the complex reduced to the simple, as a character in literature may be simply avarice personified; or (3) a certain average or normal example may be sought, as if to portray what nature seems to be aiming at in the species in question. See IDEAL, and IDEALIZATION.

Literature: VOLKELT, Aesth. Zeitfragen (1895), 134 ff.; BROWN, Fine Arts (1891), 54–70; SANTAYANA, Sense of Beauty (1896), 112–63; HERCKENRATH, Problèmes d'Esthétique et de Morale (1898), 1–66. (J.H.T.)

Type (and **Typology**) (in theology). An object in the Old Testament dispensation which symbolized or prefigured something in the Christian dispensation; the former is called also the 'prototype' of the latter.

Typology is the system of such symbols and prefigurations as are found in the Old Testament. The Paschal Lamb, for example, symbolizes the sacrifice of Christ in the new dispensation, and more specifically the Sacrament of the Eucharist, which has taken its place.

Literature: HILLER, Neues Syst. alter Vorbilder (1858); HOFMANN, Wahrsagung und Erfahrung (1841); ED. BÖHMER, Die Offenbarung (1855). (A.T.O.)

Types (mental): Ger. (*Gemüths-*, &c.) *Typen, geistige Eigenarten*; Fr. *types mentaux*; Ital. *tipi mentali*. A term employed in VARIATIONAL PSYCHOLOGY (q. v.) to designate certain well-marked differences of mental constitution, or certain modes of mental functioning, which characterize groups of individuals. The characters are thus 'typical' rather than 'individual.' (E.B.T.–J.M.B.)

Thus we speak of the adolescent type, the criminal type, the South German type, &c.

Since, however, 'individuality' or 'character' or 'personality' forms a whole of great complexity, it is better to narrow the use of the word 'type' to a single department of the mental life. We then have 'memory types,' 'types of volition,' 'emotional types,' &c.

As an instance of the use of 'type' in a broad sense, we may cite Stern's classification of the observers in the psychological laboratory as 'objective' (yielding themselves to the stimulus) and 'subjective' (expectant, suggestible); *Zeitsch. f. Psychol.*, xxii. (1899) 13; cf. Bolton, *Amer. J. of Psychol.*, vi. (1893) 208. Stern distinguishes, in the narrower sense, types of sensitivity, of 'thought' (*Anschauung*; the ordinary 'memory type'), of memory, of association, of apprehension, of attention, of power of combination, of judgment, of reaction, of feeling, of mental *tempo*, and of mental energy. See his work, *Ueber Psychol. d. individuellen Differenzen* (1900, with a bibliography of 190 titles); Titchener, *Exper. Psychol.*, i. Pt. II. xxv. ff., 387 ff. (E.B.T.)

The theory of mental types owes much of its development to the work of the pathologists, notably the French investigators of SPEECH AND ITS DISORDERS (q. v.). They have found differences in the brain mechanism of speech and its localization according to the type of preferred function of the individual (see the literature of APHASIA and of INTERNAL SPEECH). Various tests have also been devised for determining an individual's type (see TESTS, psychophysical). Attempts have been made to base methods of instruction upon the type differences of children (see e.g. the writer's *Story of the Mind*, chap. viii). Cf. TEMPERAMENT, and REACTION TIME. (J.M.B.)

Type-theory (of reaction): see REACTION TIME, passim.

U

Ubication [Lat. *ubicatio*, from *ubi*, where]: Ger. and Fr. the same; Ital. *ubicazione*. A term of scholastic philosophy to express the placing of an entity.

It includes minds in its reference as well as bodies; in the former sense it signifies the point where mind is regarded as acting on body. See Harper, *The Metaphysics of the School*, 413–4. (J.D.)

Ubiquity [Lat. *ubique*, everywhere, from *ubi*, where, through Fr.]: Ger. *Allgegenwart* (omnipresence); Fr. *ubiquité*; Ital. *ubiquità*. (1) Presence in an indefinite number of places at the same time.

(2) OMNIPRESENCE (q. v.). (J.M.B.)

Ugly [Icel. *uggligr*, fearful, dreadful]: Ger. *hässlich*; Fr. *laid*; Ital. *laido*. Applied to that which is aesthetically repellent or offensive. (J.R.A.–J.M.B.)

The relation of the ugly to beauty and its right to a place in aesthetic experience have been questions of constantly increasing interest to aestheticians. Aristotle admitted the ugly in painting, as did Plutarch; the latter because of the admiration aroused for the skill of the artist, the former because of the interest and pleasure felt by the spectator in the recognition of the object represented. Plotinus, regarding beauty as the intrinsically rational, excluded the ugly as the irrational, leaving open the question whether in reality anything is absolutely irrational and so really ugly. Augustine admits the ugly as enhancing by its apparent contrast the richness and harmony of beauty. Modern writers in aesthetics have accorded the ugly relatively much more attention than did the ancients. The general tendency has been away from the doctrine of the purely ugly as a mere foil and counterpart of beauty or an incidental element in aesthetic experience, towards a recognition of it as a feature without which art could not be true to life in its larger meaning, and could not adequately present the intrinsic rationality of a world like ours, in which so much of irrationality inheres. (Thus Rosenkranz, writing under the influence of Kant and Hegel; also from an antithetic standpoint, Hartmann.) In its character as disagreeable, the ugly is generally recognized as entering legitimately into the conflicts involved in the tragic and the comic, occurring also in the plastic forms closely related to the comic, e. g. the grotesque and fantastic.

Literature: BOSANQUET, Hist. of Aesthetic (1892); HARTMANN, Aesthetik, i (1886), ii (1887); ROSENKRANZ, Aesthetik d. Hässlichen (1853). (J.R.A.)

Ulrici, Hermann. (1806–84.) Born at Pförten, in Brandenburg, Germany, he was educated in law at Halle and Berlin. After 1829 he studied philosophy, and (1834) became professor of philosophy at Halle, where he died. He was for many years editor of the *Zeitsch. f. Philos. u. philos. Kritik*.

Ultimate [Lat. *ultimus*, furthest]: Ger. *allerletzt, End-(glied*, &c.); Fr. *dernier, ultime, final*; Ital. *ultimo*. (1) Last in a series; especially, in a series of purposes each, except the last, subsidiary to an *ulterior* one following it in the arrangement considered, or of actions each of which, except the last, leads to the performance of another.

Thus, the phrase *ultimate signification* implies that a sign determines another sign of the same object, and this another; and so on until something is reached which is a sign only for itself. *Ultimate fact* implies that

there is a series of facts each explicable by the one following it, until a fact is reached utterly inexplicable. (Cf. Hamilton's *Reid*, Note A, § 5, II vi. et seq.).

(2) Applied also to the limiting state of an endless series of states which approach indefinitely near to the limiting state, and on the whole nearer and nearer, without necessarily ever reaching it; although the word ultimate does not imply a denial of actual attainment.

Thus, it has been held that a real object is that which will be represented in the ultimate opinion about it. This implies that a series of opinions succeed one another, and that it is hoped that they may ultimately tend more and more towards some limiting opinion, even if they do not reach and rest in a last opinion. Cf. TRUTH AND ERROR, Logical. (C.S.P.)

Ultra- [Lat. *ultra*, beyond]. Extreme; used in compounds, as ultra-sensational, ultra-idealism, &c. (J.M.B.)

Ultramontanism [Lat. *ultramontanus*, beyond the mountain]: Ger. *Ultramontanismus*; Fr. *ultramontanisme*; Ital. *ultramontanismo*. In the Roman Catholic Church, the principles and tendencies of those who aim to increase and consolidate the power of the pope, and especially to maintain his temporal power intact.

Ultramontanism is opposed to GALLICANISM (q. v.) and constitutes a centralizing tendency in the Church. The dogma of the infallibility of the pope was regarded as a triumph of the Ultramontane influence. In recent years Ultramontanism and Gallicanism have lost a large measure of their party significance and have come to stand for opposing tendencies within the Catholic Church. (A.T.O.)

Unbelief (religious): Ger. *Unglaube*; Fr. *incrédulité*; Ital. *miscredenza*. That attitude of mind towards religion which is not simply negative but involves positive disbelief of some of the doctrines or practices of religion.

Unbelief presupposes the positive rejection of the claims of religion, and in the minds of most religious persons is associated with a degree of moral obliquity. In the popular mind it is identified with infidelity. Cf. BELIEF (especially in theology and religion). (A.T.O.)

Unconditional: see ABSOLUTE, and CONDITIONED.

Unconscious: Ger. *unbewusst*; Fr. *inconscient*; Ital. *inconscio, incosciente*. (1) In general, not conscious, non-mental; not possessed of mind or consciousness.

The word is thus used, in psychology, of bodily states in or during which consciousness lapses. So James speaks of 'sleep, coma, fainting, epilepsy, and other unconscious conditions' (*Princ. of Psychol.*, i. 199).

(2) The word is sometimes used, in experimental psychology, to cover psychophysical (i.e. presumably cortical) processes which, for various reasons, lack their normal conscious correlates.

This use is not well defined; the following instances will, however, illustrate it fairly well. (*a*) A lecturer goes on the platform with a severe neuralgia. He 'forgets' the pain in the excitement of his topic; but the neuralgia 'returns' at the conclusion of his address (W. B. Carpenter, *Princ. of Mental Physiol.*, 1888, 6th ed., 138 f.). (*b*) 'All the separately imperceptible overtones of a clang contribute something . . . to the perception of the whole; and the sum of these contributions constitutes what we call clang-tint.' This 'co-operation of unnoticed components in the total effect of a connection of conscious processes' is characteristic of fusion and of attention (O. Külpe, *Outlines of Psychol.*, Eng. trans., 1895, 290 f.). (*c*) Fechner's experiment. Hold a tuning-fork to the ear, until the tonal sensation has entirely ceased. Remove the fork: the silence is deeper than before. Bring the fork to the ear again: a faint tone may be heard.

(3) Specifically, a postulate of the Herbartian psychology. 'Unconscious mental excitations (*seelische Erregungen*), of whose nature we are ignorant, are interposed between our conscious ideas; every conscious idea arises out of, and dies away into, such an unconscious excitation' (T. Lipps, *Grundthatsachen des Seelenlebens*, 1883, 125 ff.; cf. *Ber. ü. d. 3. int. Cong. f. Psychol.*, 1897, 146 ff.).

Historically important are (*a*) the doctrine of unconscious cerebration (Hamilton, Carpenter, J. S. Mill; see Carpenter's *Mental Physiol.*, 515 ff.), and (*b*) the more specific Helmholtzian doctrine of unconscious inference (*Physiol. Optik*, 2nd ed., 602, 962).

For a general discussion of the 'unconscious' in psychology see Baldwin, *Senses and Intellect*, 1890, 45–58, 68; Höfler, *Psychologie*, § 43, 270 ff. (E.B.T.)

Unconscious (the, philosophy of): Ger. *Philosophie des Unbewussten*; Fr. *philosophie de l'inconscient*; Ital. *filosofia dell' Inconscio*. The metaphysical system of E. v. Hartmann, by whom the absolute principle is called 'the Unconscious.'

'According to v. Hartmann (*Philos. d. Unbewussten*, 3) the unconscious is the absolute principle, active in all things, the force which is operative in the inorganic, organic, and mental alike, yet not revealed in consciousness (ibid., 365). It is the unity of unconscious presentation and will (ibid., 380) of the logical (idea) and the alogical (will). The unconscious exists independently of space, time, and individual existence, timeless before the being of the world (ibid., 376). For us it is unconscious, in itself it is superconscious (überbewusst)' (cf. Eisler, *Wörterb. d. philos. Begriffe*, 'Unbewusst'). (J.M.B.)

Unconscious Mental States. Supposed factors of experience which are not discoverable as states of consciousness. Cf. Unconscious, Subconscious, and Unconscious (the, philosophy of).

Literature: see Unconscious; also Hamilton, Lects. on Met.; Taine, Intelligence; Rabier, Leçons de Psychol. (J.M.B.)

Unconscious Selection: see Selection (in biology), and Artificial Selection.

Unconscious State (in pathology): Ger. *unbewusster Zustand*; Fr. *état inconscient*; Ital. *incoscienza, stato incosciente* (or *inconscio*), *inconsapevolezza* (E.M.). A condition of little or no consciousness.

Abnormal deviations from ordinary conditions of consciousness are of various kinds, degree, and import. They may be roughly distinguished according as there is an absence or abeyance of consciousness, a subnormal degree of consciousness, or a marked modification of consciousness; but such distinction cannot be consistently maintained, as many conditions present variations from the normal in more than one of these respects. In general, sleep or drowsiness, the action of a hypnotic, a faint, illustrate the kind of change referred to in the first; hypnotic suggestion, reverie, ecstasy, that of the second; and changes of personality, hysteria, mania, delusions, that of the third group. (For descriptions of these see especially Sleep, Dreams, Hypnosis, Trance, Personality (alterations of), and Hallucinations.) In a strict sense unconsciousness refers to the absence of consciousness, but the actual use includes all subconscious states, or those in which there is a limited sensitiveness to ordinary impressions. Normal states of subconsciousness may thus be found in a condition of abstraction, reverie, 'absent-mindedness,' the transition from sleep to wakefulness, while profound sleep represents normal unconsciousness. As more or less abnormal instances of subconscious states may be cited somnambulism, certain forms of trance, the condition resulting from slight doses of certain drugs (see Psychic Effect of Drugs), while unconsciousness appears in deep narcosis, stupor, faint, coma, &c. Cf. Subconscious, and Unconscious.

In true insanity unconscious states appear in the profound self-absorption of melancholia, while in the mental condition of idiocy or dementia there is an insensibility to outer impressions of different origin but like appearance. (J.J.)

Understanding and Reason: Ger. *Verstand und Vernunft*; Fr. *entendement et raison*; Ital. *intendimento e ragione*. This pair of correlative terms is used to distinguish two forms of knowledge, one of which, Understanding (q.v.), is discursive, and hence based on premises and hypotheses themselves not subjected to reflection, while the other, Reason (q. v.), apprehends in one immediate act the whole system, both premise and inference, and thus has complete or unconditioned validity.

Accordingly, to those who hold to this distinction, the understanding is the instrument of scientific knowledge, the reason the instrument of philosophic. The need of the distinction was felt as early as Plato. He defines the comprehensive and self-sufficing knowledge as *νόησις* (see Nous); the conditional as *διάνοια*—reflective, 'knowing through' another, and hence mediate (*ἐπιστήμη* is used differently, sometimes as including both; sometimes as reflective or mediate; sometimes as original and intuitive). Aristotle uses the term *νόησις* in the same sense, with a more technical consideration of the axiomatic or self-evident. For mediate knowledge which yet arrives at certainty (as distinct from that of mere probability, *δόξα*, Opinion, q. v.), he uses the term *τέχνη* (this is empirical knowledge, plus a knowledge of its reason or ground. As pointed out by Erdmann, *Hist. of Philos.*, i. 134, the use of this term meaning also 'art,' as against the *δίανοια* of Plato, is due to the fact that mathematics is its type to Plato, while to Aristotle it is trained skill, like that of the physician. It is experience rationalized).

The Neo-Platonic thinkers, here as elsewhere, multiply distinctions; but, in essence, they are true to Plato. Scholasticism keeps the ideas, and derives its terms from Boethius (Eucken, *Philos. Terminol.*, 59). *Intellectus*

is synonymous with *noesis*, and *ratio* with reflective knowledge. (Hence the ambiguity of 'reason' in English: meaning often reason*ing*, or reflective thought, and less often intuitive and certain knowledge; *raison* in French is so filled with the concept of logical process that it is hardly fit at all to translate the German Vernunft.) But the significance of the modern distinction is due to Kant. The understanding is thought working according to the schematized categories, and so having validity in relation to experience; reason is thought working without reference to the application of concepts to the material of sense, hence soaring into the supersensuous, and so, while giving us certain ideals of a regulative value, sharing no positive (or constitutive) worth. Coleridge made much of the distinction in English, but without any regard to Kant's careful and critical limitations. Hegel developed the ideas so that reason should express a knowledge which is immediate in certainty and grasp, but the result of the development of the understanding to its full implications (*Lesser Logic*, chap. vi). See SPECULATION. He seems to follow Nicholas of Cusa, who defines understanding as distinguishing and name-giving, separating opposites according to the principle of contradiction, and reason as that which recognizes the compatibility of opposites. (J.D.)

Under-statement: Ger. *Unteraussage*; Fr. *jugement subordonné, proposition subalterne*; Ital. *subalterna* (or *subordinata*) *proposizione*. A proposition derived from another as an immediate inference, but not equivalent to it; the proposition q, if p implies q, but q does not imply p.

Thus *No a is both b and c* is an understatement to *No a is b*; it states only half as much, for *No a is b* affirms that *No a is bc* and also that *No a is b̄c̄*. From *Whoever breaks, pays*, we can infer *Some who break* (*if there are any who break*) *pay*, but not conversely. (C.L.F.)

Undertaker: see ENTREPRENEUR.

Undulation: see VIBRATION.

Unfitness: Ger. *Unangemessenheit*; Fr. *disconvenance* (most general and most philosophical term in use—TH.F.); Ital. *incapacità*. See FIT, and FITNESS (various topics).

Unicellular Organisms: Ger. *einzellige Organismen*; Fr. *organismes unicellulaires*; Ital. *organismi unicellulari*. Living creatures of a single cell.

They comprise the unicellular animals (the PROTOZOA, q.v.), unicellular (Protophytic) plants, and the undeveloped ovules of the (multicellular) METAZOA (q.v.). Cf. AMOEBA for certain details. Interesting work has been done in investigating the behaviour of unicellular organisms under various experimental conditions, for which see the literature.

Literature: DAVENPORT, Compar. Morphol.; JENNINGS, series of papers, i–vii, in the Amer. J. of Physiol., 1899 ff.; CALKINS, The Protozoa (1901). (J.M.B., E.B.P.)

Unification of Knowledge: not in use in other languages. A phrase used by Herbert Spencer to define philosophy. He distinguishes three stages of knowledge. The first is ordinary unscientific knowledge, in which each fact stands detached and unconnected. It is ununified. Science generalizes related truths of various departments, but does not attempt to bring these generalizations into a single whole. It is partially unified knowledge. 'The truth of philosophy bears the same relation to the highest scientific truths that each of these bears to lower scientific truths. . . . It is completely unified knowledge.' That is, it takes the generalizations of, say, physics, psychology, and sociology, and reduces them to special cases of a still more general law. In Spencer's theory this highest generalization, through which knowledge is completely unified, is that of evolution and dissolution considered as the formula of the redistribution of matter and motion, and derived from the persistence of force (*First Princ.*, Pt. II. chap. i; see also Guthrie, *On Spencer's Unification of Knowledge*). (J.D.)

Uniformitarianism: Ger. (*Theorie der*) *Stetigkeit der Naturentwickelung*; Fr. *naturalisme unitaire* (not exact—TH.F.); Ital. (*dottrina di*) *uniformità di Natura* (E.M.). The theory that the world as a whole, including the mental and moral, is (1) the outcome of a single system of forces, or (2) the realization of a single principle or law operative without breaks and without interference from without. Cf. UNIFORMITY (2), (3), (4), and CONTINUITY.

This view is often hit off by the motto *Natura non facit saltum*. The term has come into wider use since the rise of the doctrine of evolution, on the one hand, and the philosophy of Hegel, on the other hand. It is a point of view common to naturalism, idealism, and monism; but it is opposed to occasionalism, supernaturalism, and dualism (in metaphysics). (J.M.B., G.F.S.)

Uniformity [Lat. *unus*, one, + *forma*, shape]: Ger. *Ein-* (or *Gleich-*) *förmigkeit*;

Fr. *uniformité*; Ital. *uniformità*. (1) A fact consisting in this: that, of a certain genus of facts, a proportion approaching unity (the whole) belong, in the course of experience, to a certain species; so that, though of itself the knowledge of this uniformity gives no information concerning a certain thing or character, yet it will strengthen any inductive conclusion of a certain kind.

It is, therefore, a high objective probability concerning an objective probability. There are, in particular, four classes of uniformities, the knowledge of any of which, or of its falsity, may deductively strengthen or weaken an inductive conclusion. These four kinds of uniformity are as follows:—

i. The members of a class may present an extraordinary resemblance to one another in regard to a certain line of characters. Thus, the Icelanders are said to resemble one another most strikingly in their opinions about general subjects. Knowing this, we should not need to question many Icelanders, if we found that the first few whom we met all shared a common superstition, in order to conclude with considerable confidence that nearly all Icelanders were of the same way of thinking. Philodemus insists strongly upon this kind of uniformity as a support of induction.

ii. A character may be such that, in whatever genus it occurs at all, it almost always belongs to all the species of that genus; or this uniformity may be lacking. Thus, when only white swans were known, it would have been hazardous to assert that all swans were white, because whiteness is not usually a generic character. It is considerably more safe to assert that all crows are black, because blackness is oftener a generic character. This kind of uniformity is especially emphasized by J. S. Mill as important in inductive inquiries.

iii. A certain set of characters may be intimately connected so as to be usually all present or all absent from certain kinds of objects. Thus, the different chemical reactions of gold are so inseparable that a chemist need only to succeed in getting, say, the purple of Cassius, to be confident that the body under examination will show every reaction of gold.

iv. Of a certain object it may be known that its characteristic is that when it possesses one of a set of characters within a certain group of such sets, it possesses the rest. Thus, it may be known of a certain man that to whatever party he belongs, he is apt to embrace without reserve the entire creed of that party. We shall not, then, need to know many of his opinions, say in regard to politics, in order to infer with great confidence his position upon other political questions.

(2) The word 'uniformity' plays such a singular and prominent *rôle* in the logic of J. S. Mill that it is proper to note it. He was apt to be greatly influenced by Ockham's razor in forming theories which he defended with great logical acumen; but he differed from other men of that way of thinking in that his natural candour led to his making many admissions without perceiving how fatal they were to his negative theories. In addition to that, perhaps more than other philosophers, in endeavouring to embrace several ideas under a common term, he often leaves us at a loss to find any other character common and peculiar to those notions except that of their having received from him that common designation. In one passage of his *System of Logic* (1842), he declares, in reference to the difference in strength between two inductive conclusions, that whoever shall discover the cause of that difference will have discovered the secret of inductive reasoning. When, therefore, he shortly afterwards points out that the distinction between those two inductions is that one of them is supported by a uniformity of the second of the above four classes, while the other is met by a distinct diversity of the same kind, and when he himself gives to that uniformity this designation when he afterwards declares that the validity of induction depends upon uniformity, his reader naturally supposes he means uniformity in that sense. But we find that he employs the word for quite another purpose. Namely, he does not like the word *law*, as applied to an inductive generalization of natural facts —such as the 'law' of gravitation—because it implies an element in nature, the reality of a general, which no nominalist can admit. He, therefore, desires to call the reality to which a true universal proposition about natural phenomena corresponds, a 'uniformity.' The implication of the word, thus used, is that the facts are, in themselves, entirely disconnected, and that it is the mind alone which unites them. One stone dropping to the earth has no real connection with another stone dropping to the earth. It is, surely, not difficult to see that this theory of uniformities, far from helping to establish the validity of induction, would be, if consistently admitted, an insuperable objection to such validity.

For if two facts, *A* and *B*, are entirely independent in their real nature, then the truth of *B* cannot follow, either necessarily or probably, from the truth of *A*. If I have tried the experiment with a million stones and have found that every one of them fell when allowed to drop, it may be very natural for me to believe that almost any stone will act in the same way. But if it can be proved that there is no real connection between the behaviour of different stones, then there is nothing for it but to say that it was a chance coincidence that those million stones all behaved in the same way; for if there was any *reason* for it, and they *really* dropped, there was a *real reason*, that is, a real general. Now, if it is mere chance that they all dropped, that affords no more reason for supposing that the next will drop, than my throwing three double-sixes successively with a pair of dice is a reason for thinking that the next throw will be double-sixes.

(3) But now we find that Mill's good sense and candour will not allow him to take the course which a Hobbes would have taken, and utterly deny the validity of induction; and this leads to a new use of the word *uniformity*, in which he speaks of the 'uniformity of nature.' Before asking exactly what this phrase means, it may be noted that, whatever it means, the assertion of it is an assent to scholastic realism, except for a difference of emphasis. For to say that throughout the whole course of experience, events always, or even only usually, happen alike under the same conditions (what is usually called the 'invariability' of nature), is to assert an agreement (complete or partial) which could not be ascribed to chance without self-contradiction. For chance is merely the possible discrepancy between the character of the limited experience to which it belongs and the whole course of experience. Hence, to say that of the *real*, objective facts some *general* character can be predicated, is to assert the reality of a general. It only differs from scholastic realism in that Mill and his followers treat this aspect of the matter lightly—that is to say, the objective reality of the general—while the Scholastics regarded it as a great and vital feature of the universe. Instead of 'uniformity' now importing that what others call 'laws' are fabrications of the human mind, this 'uniformity of nature' is erected by Mill into the greatest of laws and absolutely objective and real.

Let us now inquire what the 'uniformity of nature,' with its synonymous expressions that 'the future resembles the past,' and so forth, can mean. Mill says that it means that if all the circumstances attending two phenomena are the same, they will be alike. But taken strictly this means absolutely nothing, since no two phenomena ever can happen in circumstances precisely alike, nor are two phenomena precisely alike. It is, therefore, necessary to modify the statement in order to give it any meaning at all; and it will be found that, however it may be so modified, the moment it begins to carry a definite meaning, one of three things results: it becomes either, first, grossly false, or, second, an assertion which there is really no good reason to believe even approximately true, or thirdly, it becomes a quasi-subjective truth, not lending any colour of validity to induction proper. If, for example, we were to say that under any given species of circumstances presenting any similarity, phenomena of any given genus would be found to have a specific general resemblance in contrast with the specific character of phenomena of the same genus occurring under a different species of circumstances of the same genus, this would be monstrously false, whether intended as an absolutely universal proposition or merely as one approximately true. Let, for example, the genus of phenomena be the values of the throws of a pair of dice in a given series of successive throws indefinitely continued. Let the first species of circumstances be that the ordinal number of a throw in the series is *prime*. It is pretty certain that there would be no general character in the corresponding values of throws to distinguish them from those which would result when the ordinal number is divisible by 2, or by 3, or by any other prime. It thus appears that when we take *any* genus of circumstances, the law turns out false. Suppose, then, that we modify it by saying that, taking any genus of phenomena and separating this into two species, there will be found in the discoverable circumstances *some* general resemblance for all those attending phenomena of the same species in contrast to those attending phenomena of the other species. This is a proposition which there is not the slightest reason to believe. Take, for example, as the genus of phenomena, the many thousands of Latin descriptions of American species of plants by Asa Gray and his scholars. Now consider the species of this genus of phenomena which agree in this respect, that the

two first words of the description have their first vowels the same. There is no reason to suppose that there was any general respect in which the circumstances of that species of the genus of phenomena agree with one another and differ from others, either universally or usually. It is a mere chance result. It is true that some persons will not be inclined to assent to this judgment; but they cannot prove it otherwise. It can afford no adequate basis for induction. We see, then, that when we consider *all* phenomena, there is no way of making the statement sufficiently definite and certain. Suppose, then, that we attempt still another modification of the law, that, of *interesting* resemblances and differences between phenomena, some considerable proportion are accompanied by corresponding resemblances and differences between those of the circumstances which appear to us to be *pertinent*. The proposition is now rather psychological than metaphysical. It would be impossible, with any evidentiary basis, to strengthen the expression 'some considerable proportion'; and in other respects the statement is vague enough. Still, there is sufficient truth in it, perhaps, to warrant the presumptive adoption of hypotheses, provided this adoption merely means that they are taken as sufficiently reasonable to justify some expense in experimentation to test their truth by induction; but it gives no warrant at all to induction itself. For, in the first place, induction needs no such dubious support, since it is mathematically certain that the general character of a limited experience will, as that experience is prolonged, approximate to the character of what will be true in the long run, if anything is true in the long run. Now all that induction infers is what would be found true in the usual course of experience, if it were indefinitely prolonged. Since the method of induction must generally approximate to that truth, that is a sufficient justification for the use of that method, although no definite probability attaches to the inductive conclusion. In the second place, the law, as now formulated, neither helps nor hinders the validity of induction proper; for induction proper consists in judging of the relative frequency of a character among all the individuals of a class by the relative frequency of that character among the individuals of a random sample of that class. Now the law, as thus formulated, may tend to make our hypothesis approximately true; but that advantage has been gained before the operation of induction, which merely tests the hypothesis, begins. This inductive operation is just as valid when the hypothesis is bad as when it is good, when the character dealt with is trivial as when it is interesting. The ratio which induction ascertains may be nearer $\frac{1}{2}$, and more remote from 1 or 0, when the characters are uninteresting; and in that case a larger number of instances will usually be requisite for obtaining the ratio with any given degree of precision (for if the ratio is really 1 or 0, it will be almost a miracle if in the sample it is far from that ratio, although this will not be impossible, if the whole class is infinite), but the essential validity of the process of induction remains unaffected by that circumstance.

What is usually meant by the uniformity of nature probably is that in proportion as the circumstances are alike or unlike, so are any phenomena connected with them alike or unlike. It may be asked to what degree nature is uniform in that sense. The only tenable answer is that it is as little uniform as it possibly could be imagined to be; for were any considerable proportion of existing uniformities, or laws, of nature destroyed, others would necessarily thereby result.

In fact, the great characteristic of nature is its diversity. For every uniformity known, there would be no difficulty in pointing out thousands of non-uniformities; but the diversities are usually of small use to us, and attract the attention of poets mainly, while the uniformities are the very staff of life. Hence, the higher and wider are our desires, the greater will be the general impression of uniformity produced upon us by the contemplation of nature as it interests us.

(4) There are senses in which nature may not irrationally be held to be uniform; but opinions differ very widely as to the extent and nature of this uniformity. The chief of these are as follows:—

(*a*) The majority of physicists, at least of the older generation, hold, with regard to the physical universe, that its elements are masses, their positions, and the variations of these positions with time. It is believed that every motion exactly obeys certain laws of attraction and repulsion; and there is no other kind of law, except that each atom or corpuscle is a centre of energy arranged in equipotential surfaces about it, which follow a regular law; and that this is a permanency. But the equations of motion are differential equations of the second order, involving,

therefore, two arbitrary constants for each moving atom or corpuscle, and there is no uniformity connected with these constants. At least, no such uniformity is, with the least probability, discoverable. As for the distribution of potential about an atom or corpuscle, it is regular; but there is no ulterior reason for that regularity, or, at least, none is probably discoverable. What is absolutely beyond discovery, whether direct and specific or indirect and general, may be considered to be non-existent.

From this usual and in some sense standard opinion there are many divergences in both directions. First, in the direction of greater uniformity.

(*b*) Some hold that there is some exact uniformity in the arbitrary constants of the motion of the atoms, so that, for example, perhaps at some initial instant they all had some symmetrical or regular arrangement, like a pack of cards unshuffled; and that the velocities at that instant were regular also. But this regularity being of a purely aesthetic or formal kind, and the laws of motion equally formal and unrelated to any purpose, it follows that all kinds of arrangements will be produced, ungoverned by any uniformity, but mere effects of chance. Three stars may, for example, at some instant form an equilateral triangle; but there would be no particular reason for this: it would be merely a casual coincidence.

(*c*) Others go further and maintain that the constants of position and velocity are subject to a law not merely formal, but are governed by final causes in such a way that there is no arrangement or coincidence whatever which was not specially intended by the Creator. To this theory, such words as *pro*-vidence and *fore*-knowledge are ill adapted; because the two constants which each atom or corpuscle has, remain constant throughout all time, and ought not to be considered as having been fixed at any particular epoch. The very idea is that the arrangement is determined by what would be the result of different arrangements at each period of time. If, for example, a given prayer effects rain, it must be supposed that in view of that prayer, and as its consequence, the different atoms had the appropriate constants; but that these were not given to the atoms at any particular epoch, being permanent values. Any intentional action on the part of a free agent is to be explained in the same way. If an agent is to be supposed really free, it is difficult to see what other physical explanation is compatible with the exactitude of law. This seems to be substantially the notion of most of those who have supported free-will.

On the other hand, many philosophers suppose a less degree of uniformity in nature than is supposed in opinion (*a*). Of these the following have come to the present writer's notice as being actually defended.

(*d*) Some suppose that while law is absolute, yet there are constantly arising cases analogous to unstable equilibrium in which, owing to a passage of a velocity through infinity or otherwise, the law does not determine what the motion shall be. Thus if one Boscovichian point attracts another inversely as the square of the distance, and they move in one straight line, then when they come together they may move through one another, or move backwards on the same line, or may separate along any other line, without violating the differential equation. Such 'singularities,' as the mathematicians say, are theoretically possible; and may be supposed to occur very often. But to suppose that free action becomes possible in such a way is very illogical. In the first place, it supposes a direct interaction between 'mind' and matter; infinitesimal, no doubt, but none the less real. Why not better suppose a slight but finite action of this kind, and so avoid the following objections? Namely, in the second place, this is to put faith, not scientific credence, in the inductive laws of matter infinitely beyond what induction can ever warrant. We know very well that mind, in some sense, acts on matter, and matter on mind: the question is *how*. It is not in speculations of this fanciful kind that the true answer is likely to be found. In the third place, although this speculation wanders so far beyond all present knowledge, it nevertheless comes into conflict with a legitimate induction, namely, the supposition of any real 'singularity' or breach of continuity in nature is in as distinct conflict with all our knowledge as is a miracle.

(*e*) Sundry far less tenable hypotheses of lacunae between inviolable laws have often been proposed. One opinion frequently met with is that the law of energy does not prescribe the direction of velocity, but only its amount; so that the mind may cause atoms to 'swerve,' in regular Lucretian fashion. This singular notion has even been embraced by mathematicians, who are thinking of a projectile shot into a curved tube, or other case of an equation of condition. Of course,

if mind can construct absolute constraints, it can much easier exert force that is finite. Other writers suppose lacunae, without telling us of what particular description they are; they seem to think law is absolute as far as it goes, but that its jurisdiction is limited.

(*f*) Much more philosophical and less logically objectionable is the notion of St. Augustine and others (it is near to the opinion of Aristotle) that the only fundamental kind of causation is the action of final causes, and that efficient causation is, in all cases, secondary. Accordingly, when a miracle occurs there is no violation of the real *cursus naturae*, but only of the apparent course of things.

(*g*) The hypothesis suggested by the present writer is that all laws are results of evolution; that underlying all other laws is the only tendency which can grow by its own virtue, the tendency of all things to take habits. Now since this same tendency is the one sole fundamental law of mind, it follows that the physical evolution works towards ends in the same way that mental action works towards ends, and thus in one aspect of the matter it would be perfectly true to say that final causation is alone primary. Yet, on the other hand, the law of habit is a simple formal law, a law of efficient causation; so that either way of regarding the matter is equally true, although the former is more fully intelligent. Meantime, if law is a result of evolution, which is a process lasting through all time, it follows that no law is absolute. That is, we must suppose that the phenomena themselves involve departures from law analogous to errors of observation. But the writer has not supposed that this phenomenon had any connection with free-will. In so far as evolution follows a law, the law of habit, instead of being a movement from homogeneity to heterogeneity, is growth from difformity to uniformity. But the chance divergences from law are perpetually acting to increase the variety of the world, and are checked by a sort of natural selection and otherwise (for the writer does not think the selective principle sufficient), so that the general result may be described as 'organized heterogeneity,' or better rationalized variety. In view of the principle of continuity, the supreme guide in framing philosophical hypotheses, we must, under this theory, regard matter as mind whose habits have become fixed so as to lose the powers of forming them and losing them, while mind is to be regarded as a chemical genus of extreme complexity and instability. It has acquired in a remarkable degree a habit of taking and laying aside habits. The fundamental divergences from law must here be most extraordinarily high, although probably very far indeed from attaining any directly observable magnitude. But their effect is to cause the laws of mind to be themselves of so fluid a character as to simulate divergences from law. All this, according to the writer, constitutes a hypothesis capable of being tested by experiment.

Literature: besides most treatises on LOGIC (q. v., especially inductive) see RENOUVIER and PRAT, La nouvelle Monadologie (1899).

(C.S.P.)

Uniformity (notion of). The objective regularity and orderliness presupposed in the possibility of representing the real world by an ideal construction. 'Whenever any two or more attributes are repeatedly to be connected together, closely or remotely in time or in space, there we have a uniformity. And the general expression, the uniformity of nature, is intended to cover all such partial connections, and to imply that their existence may be detected or reasonably inferred throughout all phenomena whatever' (Venn, *Empirical Logic*, 93).

All contrivance of means towards ends, and indeed all adjustment of action in accordance with previous experience, presupposes as the condition of effectiveness more or less uniformity of coexistence and sequence in natural phenomena. Practical needs lead us to seek for uniformities, and the world is so constituted that we find them. With the development of experience these uniformities assume the form of a system, and a theoretical interest arises in the extension of this system. Finally, the conception of natural process as determined, everywhere and in every minutest detail, by fixed laws comes into being.

(G.F.S., J.M.B., C.L.F.)

Uniformity of Nature: see UNIFORMITY (3, 4).

Unison [Lat. *unus*, one, + *sonus*, sound]: Ger. *Einklang*; Fr. *unisson*; Ital. *unisono*. The most perfect chord, in which both tones have the same pitch. See Helmholtz, *Sensations of Tone* (Eng. trans.), 187. (E.B.T.)

Unit (of physical measurement) [Lat. *unitas*]: Ger. *Einheit*; Fr. *unité*; Ital. *unità*. A portion of any magnitude or quantity employed to express the value of any other portion *P* of the same magnitude or quantity

by stating the ratio of P to the unit. Cf. MEASUREMENT.

If P contains the unit an integral number of times, the ratio is that number. If P and the unit are commensurable, the ratio may be expressed by subdividing the unit into a number n of such parts that P shall contain a part an exact number of times. If m is this number, the ratio is then expressed by the fraction $\frac{m}{n}$. If P and the unit are incommensurable, a fraction can still be found which shall express the ratio with an error as small as we choose to make it, by increasing the number of parts, because the error will always be less than one-half a part.

The ratios which thus fix the values of quantities are ordinarily expressed by algebraic literal symbols, *a*, *b*, *c*, &c. In order that they may have any meaning, the unit must be of the same kind as the quantity to be expressed. There can be no ratio between quantities of unlike kinds, as a *day* and a *mile*.

Apart from this condition, the magnitude of a unit is arbitrary. But the choice may be so made as to simplify investigation; indeed, an important factor in the advance of physics has been the definition of a clear and simple system of units. In this system a limited number of quantities, generally three, have arbitrary units assigned them, and the units of all other quantities are defined in terms of these in such ways as to simplify the expression of results to be obtained. These are called *derived units*.

In physics there are three arbitrary units called fundamental:

(*a*) That of *length*, represented by the symbol L;

(*b*) That of *time*, represented by the symbol T;

(*c*) That of *mass*, represented by the symbol M.

In constructing the metric system an attempt was made to make the unit of mass a derived one by defining it as the mass of a cubic decimetre of water at maximum density. But it would be objectionable to use as absolute a unit which depends on the result of an experiment, because its value would never be definitive, and would require constant correction as more exact determinations are made. Hence the practical kilogram is simply a certain mass of metal, which the founders of the metric system made as near as possible to that of a cubic decimetre of water.

In recent times a system of units in which, for

Length, $L = 1$ centimetre,
Time, $T = 1$ second,
Mass, $M = 1$ gramme,

has come into extensive use, and is known as the C. G. S. system, from the initial letters of the three units. Some of these units have received special names, which we shall give in connection with the definitions, but others have not.

The derived units of the more common physical quantities are defined as follows:—

The unit of velocity is that velocity which, if uniform, will carry a body over unit length in unit time (C. G. S., 1 centimetre per second).

The unit of *acceleration* (of velocity) is that acceleration which will increase the velocity by a unit in unit of time.

The unit of force is that force which, acting on a body of unit mass, free to move, will impress upon it unit velocity in unit of time (called the *dyne* in the C. G. S. system).

The unit of surface or area is a square whose sides are of unit length (C. G. S., a square centimetre).

The unit of volume is a cube whose edges are each of unit length (C. G. S., a cubic centimetre).

The unit of work is the work done by unit of force acting on a body in the direction of its motion as it moves through unit length (C. G. S., the *erg*).

The unit of kinetic energy is the energy of a mass of *two* units moving with unit velocity (when $m = 2$ and $v = 1$ we have $\frac{1}{2}mv^2 = 1$). This unit is, in the C. G. S. system, also called the *erg*.

The unit of heat is that amount of heat which will raise the temperature of unit mass of water 1° C. As the amount of heat necessary to produce this effect varies with the temperature of the water, there is a small range of uncertainty in this definition, on the best way of avoiding which there is, as yet, no general consensus among physicists. The theoretically best unit of heat would be that generated by the transformation of a unit of kinetic energy or of work into heat; for example, the heat generated by the friction of dragging a weight by a force of one unit through a unit of length. This unit would be an erg, but would not be of ready practical use. The most common practical unit of heat is the *calorie*, being the amount of heat required to raise the temperature of 1 kilo-

gram of water 1° C. In the C. G. S. system the mass of water supposed in the definition should be 1 gramme. The C. G. S. unit of heat is therefore $\frac{1}{1000}$ of a calorie, but it has not received any special name.

Electrical units. In *electricity* two systems of measuring quantities of electricity are used. In the electrostatic system the unit of electricity is that quantity which will repel an equal quantity at unit distance with unit force. In the electromagnetic system the measure depends on the magnetic effect produced by an electric current. The latter system best serves ordinary purposes, and is therefore generally used. It is adopted in the following statements and definitions, in which we begin with those relating to magnetism.

A magnetic pole of unit strength is that pole which repels an equal pole at unit distance with unit force.

The unit of intensity of a magnetic field is the intensity of that field in which a unit pole is acted on by unit force.

The electric current of unit strength is, in the C. G. S. system, that current which, moving along a circular arc of radius and length both unity, will produce at the centre of the circle a field of unit intensity. It follows that if a current of strength C moves around a coil of radius r, each turn of the coil will produce, at its centre, a field intensity of

$$\frac{2\pi C}{r}.$$

The unit of quantity of electricity is the quantity conveyed by unit current in unit time.

A conductor has unit capacity when a charge of unit electricity produces unit of potential on its surface.

The difference of potential between any two points is the work required to move unit quantity of electricity from one point to the other, the algebraic sign being so taken that positive electricity tends to move from points of greater to points of smaller potential. The potential produced by positive electricity is therefore positive, and that produced by an infinitesimal quantity dq of electricity at a distance r is algebraically expressed by dq/r. Its unit may therefore be defined as the potential produced by unit of electricity at unit distance.

The electromotive force between two adjacent points is the difference of potential between those points, and has therefore the same unit as potential.

A conducting wire has unit of resistance when, with unit difference of potential between its ends, a current of unit strength passes through it.

Ohm's law is that between the electromotive force E, the strength C of a current, and the resistance R of a conductor subsists the relation

$$E = CR.$$

Some of the preceding units are either too small or too large for convenient general use. Others are therefore introduced in practice, named and defined as follows:—

The practical unit of resistance called the *ohm* is theoretically defined as

$$\text{the C. G. S. unit} \times 10^9,$$

and practically defined as the resistance of a column of mercury of uniform cross section, of mass 14·4521 grams, and 1,063 millimetres in length, at temperature 0° C. The cross section of this column is one square millimetre.

The practical unit of electromotive force, called the *volt*, is

$$\text{the C. G. S. unit of potential} \times 10^8.$$

The practical unit of current, called the *ampère*, is

$$\text{the C. G. S. unit} \div 10.$$

The practical unit of quantity of electricity, called the *coulomb*, is

$$\text{the C. G. S. unit} \div 10.$$

The practical units of capacity, called the *farad* and the *microfarad*, are:—

$$\text{Farad} = \text{C. G. S. unit} \div 10^9,$$
$$\text{Microfarad} = \text{C. G. S. unit} \div 10^{15},$$
$$= \text{Farad} \div 10^6.$$

The practical unit of work, called the *joule*, is 10^7 ergs.

The practical unit of power, called the *watt*, is the power which does one joule of work per second.

The *horse-power* is about 746 watts.

The *kilowatt* is 1000 watts.

The C. G. S. electrical units to be used in the preceding definitions are electro-magnetic. They are equal to the corresponding electrostatic units multiplied or divided by numbers approximately equal to 3×10^{10}, or its powers, as follows:—

Unit of Resistance, $\div 3^2 \cdot 10^{20}$,
„ Potential, $\div 3 \cdot 10^{10}$,
„ Current, $\times 3 \cdot 10^{10}$,
„ Quantity, $\times 3 \cdot 10^{10}$,
„ Capacity, $\times 3^2 \cdot 10^{20}$.

The number $3 \cdot 10^{10}$ is so near to the velocity of light in the C. G. S. system that it is supposed to be identical with it.

Literature: EVERETT, Units and Physical Constants. (S.N.)

Unit (social): see SOCIAL UNIT.

Unitarianism [Lat. *unus*, one]: Ger. *Unitarianismus*; Fr. *unitarianisme*; Ital. *unitarianismo*. (1) A term used by Sir William Hamilton alone (*Lects. on Met.*, i. 295) as equivalent to monism. One who denies dualism in favour of either mind or matter as the sole reality is a unitarian. (J.D.)

(2) The doctrine of a Christian sect which denies the Trinity and the divinity of Christ, thus emphasizing the oneness of God.

Unitarianism in this sense is widespread in England and the United States. (J.M.B.)

Unities (the dramatic): see UNITY AND PLURALITY, passim.

Unity (and **Plurality**) [Lat. *unitas*, oneness]: Ger. *Einheit* (and *Mehrheit*); Fr. *unité* (and *pluralité*); Ital. *unità* (and *pluralità*). Formally, unity means whatever exists, or is considered, as a single, indivisible reality, and by whose repetition composite beings, or through whose agency derived beings, exist. (J.D.)

(1) A universally accepted understanding as to the formation of Latin words would require *unity* to mean that which is essential to the number one.

If we consider the number one, irrespective of the possibility of two, three, &c., it involves no idea of number (and therefore not of totality or collection), nor even any idea of relation. The idea would, therefore, be found in a pure state only in an immediate consciousness which should make no distinction of any kind, whether between subject and object, or of the parts of the object. But the term is never used in this sense, unless with an accompanying explanation.

(2) The oneness element of experience which involves a positive assignment of the number one, and which must be originally one, and not a total.

Much may be said for the opinion that we are thus brought to the event of acting and being acted upon; for that must be *one*, and is the only element of experience whose essential peculiarity is entirely lost in any generalization of it. The negative oneness of immediate consciousness—as, for example, it appears in the idea of any particular colour—does not resist generalization, the idea of redness in general having the same sort of unity as that of the scarlet of mercuric iodide or the colour of aniline red (magenta). But the moment I pass from the idea of a particular item of my experience, such as seeing a boat with a couple of men going over Niagara, to the slightest generalization of it, such as that of the *memory* of seeing the event, or the general conception of going over Niagara, the positive oneness entirely disappears.

Nevertheless, the word unity is seldom applied to this sort of oneness, which goes by the name of *individuality*. There is no individuality in a quality of immediate consciousness such as magenta or solferino, because there is no setting of object over against subject, which is requisite before oneness can be positively assigned to an idea (positive oneness thus involving duality); but neither is there any generality in the immediate consciousness, as long as it remains nothing more than what it first was. The purest oneness does not involve the least reference to plurality, and is therefore not positively opposed to generalization, and is not destroyed when generalization takes place. But positive and insistent oneness necessarily involves, or rather springs out of, the idea of duality, and distinctly denies it; so that generalization destroys it; it is the otherness of otherness, the negation of negation.

(3) The idea which the word unity is usually employed in philosophy to express is that of a general (in the most general sense) in its relation to particulars, which would be much more accurately called 'totality.'

Unity is thus used, not to express pure oneness, nor yet positive oneness, but to express the negation of multitude in the object to which it is attributed. Thus it involves a distinct reference to the possibility, not of duality merely, as positive unity does, but of *plurality* (in the sense of more than two). The first unity might be named *simplicity* or *firstness*; the second is very appropriately termed *individuality*; the third, which is nearly what Kant terms *synthetical unity*, ought to have some better designation than *totality* or *universality*.

Unity in certain old books (as in the *Institutiones Metaphysicae* of Burgersdicius, 1647) is divided into *singular* and *universal unity*, the former belonging to singulars, the latter to universals. Singular unity is either *material* (or *numerical*) or *formal*. *Material unity* is defined as that which belongs to the

singulars in so far as they are considered as units with individualizing differences; which is an awkward attempt to define individuality. *Formal unity* is 'the unity which belongs to singulars abstractedly from their individualizing differences.' These definitions depend upon a particular theory of individuation. *Universal unity* is distinguished from *communicability*, which is the reference to the plurality of singulars; and these two elements together make up *universality*. *Numerical unity* implies repugnance to multiplication; *formal unity*, indifference to multiplication; *universal unity*, non-repugnance to multiplication. The nature of the *fundamentum universalitatis* distinguishes the mediaeval realist from the nominalist. The nominalists generally do not admit that there is any similarity in things apart from the mind; but they may admit that this exists, provided they deny that it constitutes any unity among the things apart from the mind. They cannot admit the latter and remain consistent nominalists. Thus, a nominalist may admit that there is in the events themselves an agreement consisting in the uniformity with which all stones dropped from the hand fall to the ground; but if he admits that there is anything at all, except the mere fact that they happen to do so, that should in any sense *determine* the different stones to fall every time they are dropped, he ceases to be a good nominalist and becomes a mediaeval realist. *Unity* is further divided (by Burgersdicius, whom we continue to follow) into *unity of simplicity* and *unity of composition*. *Simplicity* is said to be unity devoid of all multitude; *composition* is the union of a plurality of things. This definition of simplicity is confessedly defective in representing this mode of unity as having a reference to multitude. *Composition* is divided into *real*, *rational*, and *modal*. *Real composition* is the union of distinct entities in the real thing itself. It is either *actual* or *potential*. *Actual composition* is either *per compositionem*, as when water and alcohol are mixed, or *per aggregationem* (as in an army). *Potential composition* is when one thing is united *in potentia* to another. It is either *per informationem* or *per inhaerentiam*; a distinction peculiar to a certain kind of Aristotelianism. *Rational composition* is either of things which differ by reason alone, or of things brought together in one concept; it includes, firstly, genera, species, &c.; secondly, equality, similitude, &c.; thirdly, agreement in effects, external causes, &c. *Modal composition* is composition from a thing and a mode. Most of the above distinctions go back to Scotus, and a few are still earlier.

Unity is divided by Kant into *analytical* and *synthetical*. He never defines or explains these terms; but if we remember that, in his use of words, multiplicity of elements is essential to unity, it is easy to see that what he means by analytical unity is the unity of that which is given in its combined state and is analysed by ordinary reflection. Thus we perceive a fact; and in order to express or think it, we analyse it, and the relation of the percept to the elements resulting from this analysis is very inappropriately called *analytical unity*. But when in the formation of the percept different sense impressions are put together, so that ordinary thought cannot proceed from whole to parts, but an operation more or less subconscious is supposed to manufacture the whole out of the parts, the relation of the whole to the parts is called *synthetical unity*. Three kinds of transcendental synthesis are recognized in the first edition of the *Krit. d. reinen Vernunft*, each resulting in a *synthetical unity*: they are the synthesis of apprehension in the intuition, which produces one representation; the synthesis of reproduction in the imagination; and the synthesis of recognition in the concept, which gives the unity of the rule. The *transcendental unity of apperception* is the unity which belongs to all my cognitions arising from a correlative *unity* of consciousness. It is transcendental, objective, and original. Besides these modes of transcendental unity, Kant recognizes other kinds of synthetical unity, some of which are empirical and contingent. There are also different modes of rational unity, some speculative, others moral.

That which the Scholastics meant by *transcendental unity* was unity in the sense in which it is said *Quodlibet ens est unum*, that is, is self-consistent.

We must not forget the three *dramatic unities of time, place,* and *action*, requiring the events represented to be included in one day, in one scene, and all to relate to one plot. Unity of action is set forth by Aristotle (*Poetics*, chaps. viii, ix, xviii). Unity of time is mentioned by him. That is, the action of a tragedy should, when convenient, be compressed into one day (*Poetics*, chap. v). The unity of place was remarked by French critics to have been observed by the Greek tragedians.

A *unity* in mathematics is a quantity which multiplied by any other gives that other. There can thus be but one unity in an algebra, although there may be many units. (C.S.P.)

Aesthetic unity: singleness or congruousness of effect immediately produced through sensuous presentation.

Formal and *material unity*: scholastic terms, derived from Aristotle. Material unity is that which pertains to an individual as such, and which cannot be abstracted even in thought from the individual; the material unity of Socrates is just that which constitutes him Socrates. Formal unity is that which pertains to an individual in such a way as to be distinguishable from his individuality; the humanity of Socrates can be conceived apart from Socrates, and as such constitutes a formal unity. Cf. IDENTITY (formal, and material).

Functional unity: a unity which consists not in the composition of elements or parts of structure as such, but in the conspiring or working together of these various parts—a unity of value effected—also termed teleological unity. The term ideal unity properly has the same meaning.

Logical unity: that which is constituted by the mutual support given to one another by the various terms and propositions of reasoning in the process of establishing a conclusion.

Metaphysical unity: that whose identity is inherent, having within itself a principle of being or action which makes it essentially distinct from all other beings.

Moral unity: that which is produced by a variety of factors co-operating intentionally, and under the control of some consciously regulating principle, to bring about a particular result; in this sense the state, as well as the person, may be a moral unity.

Numerical unity: that the identity of which is external, rather than intrinsic; whatever is sufficiently marked off or separate from other things to be counted as one; also termed physical or mechanical unity. Cf. NUMBER (different topics).

Organic unity: a unity which is constituted in and through diversity, since it requires a manifold of parts or members which are mutually dependent upon one another; opposed to a mechanical unity or unity of an aggregate in which every part is so homogeneous with the other parts and with the whole as to be capable of being itself a unity, which in quality (though not in quantity) is regarded as the same as the original unit. Cf. ORGANISM.

The Kantian philosophy also supplies a number of technical distinctions (see KANTIAN TERMINOLOGY,—especially the synthetic or transcendental unity of apperception—and above).

We owe most of the main distinctions to Aristotle, who differentiated absolute and relative unity; the former being continuous and indivisible within itself, the latter complex and diversified, as of an orchestra. Unity proper he subdivided into four forms: first, that of continuity, not due to contact; second, natural unity of form and figure—that is, original, not due to violence or external force; third, individual, that which is numerically distinct; fourth, unity of the universal, that constituted by thought as present in a variety of objects—practically equivalent to the formal unity of the Scholastics.

But the philosophic interest of the idea of unity cannot be gathered from any cluster of formal definitions or distinctions. It attaches to the content of the idea. All philosophy is a search for unity, or, if this cannot be found, for unities; and it is the nature and quality ascribed to unity or unities, together with the reasons given for selecting it as such, that constitute the true philosophic history of the term. See MONISM, MONADS, PLURALISM, ONE AND MANY.

Moreover, *unum* was with the Scholastics one of the three ultimate predicates of being, and it was an axiom of philosophy that every real being is unity, and every true (not artificial) unity is being. Hence the standard and definition of unity and substance are the same. See SUBSTANCE, and TRANSCENDENT. The whole question of the philosophic ground of mathematics (on the side of arithmetic and algebra) is connected with the question of unity. (J.D.)

Unity in Variety: Ger. *Einheit in der Mannigfaltigkeit*; Fr. *unité dans la variété*; Ital. *unità nella varietà*. An agreement in certain respects of several objects or parts of one object, which differ in other respects, thus capable of being grasped as a whole, while at the same time they are distinguished.

This is the objective correlate of the law of all intelligence which is a synthetic process of discrimination and identification or relation. The unity may be that of a spatial or temporal whole, that of identity of quality, that of conformity to some idea or law, or

that of co-operation to a single end. It relates to both form and content of the aesthetic object. While absolute unity becomes emptiness or monotony, and absolute variety would be chaos, the varying degrees in which unity or variety is prominent give rise to a range of aesthetic values. In addition to the formal element of adjustment or adaptation, and the connected free play of mental powers in apprehending objects where unity in variety is conspicuous, there seems to be involved to some extent in 'unity' the value attaching to the maintenance and recognition of one's own identity, while variety tends to enlargement and freedom.

The principle was enunciated by Plato and Aristotle in reference to literary composition, and has been given recognition as at least an important condition of formal beauty by nearly all aestheticians.

Literature: see titles under AESTHETICS, ART, and BEAUTY; see especially FECHNER, Vorschule d. Aesth. (1876), chap. vi; KÖSTLIN, Aesthetik (1869); DONKIN, Mind, 1897, 511 ff. (J.H.T.)

Unity of God (in theology): Ger. *Gotteseinheit*; Fr. *unité de Dieu*; Ital. *unità di Dio*. The doctrine that in the last analysis God is one and not many, and that the distinctions in the divine nature presuppose its substantial oneness.

Unity is the principle of monotheism. The Christian doctrine of tripersonality made it necessary to emphasize the unitary side of the divine nature. Unity may be asserted in such a way as to be inconsistent with personal distinctions. This gives abstract monotheism. Judaism rests on the monotheistic conception of Jahveh or Jehovah, which is consistent with internal distinction if not with a plurality of persons.

Literature: see MONOTHEISM, JEHOVAH, TRINITARIANISM, and UNITARIANISM. (A.T.O.)

Universal (and **Universality**) [Lat. *universalis*, pertaining to all]: Ger. *allgemein*; Fr. *universel*; Ital. *universale*. (1) This word was used in the middle ages where we should now use the word GENERAL (q. v.). Another synonym was praedicabile: 'Praedicabile est quod aptum natum est praedicari de pluribus,' says Petrus Hispanus. Albertus Magnus says, 'Universale est quod cum sit in uno aptum natum est esse in pluribus.' Burgersdicius, literally translating from Aristotle, says, 'Universale (τὸ καθ' ὅλου) appello, quod de pluribus suapte natura praedicari aptum est,' i.e. ὃ ἐπὶ πλειόνων πέφυκε κατηγορεῖσθαι. When the Scholastics talk of universals, they merely mean general terms (which are said to be *simple universals*), with the exception here following.

(2) The five terms of second intention, or more accurately the five classes of predicates, *genus*, *species*, *difference*, *property*, *accident*, were in the middle ages (as they still are) called 'the predicables.' But since predicable also means fit to be a predicate, in which sense it is almost an exact synonym of universal in the first sense, the five predicables came to be often referred to as 'the universals.'

(3) Predicated, or asserted, in a proposition *de omni*; said to be true, without exception, whatever there may be of which the subject term is predicable. See QUANTITY (in logic).

Thus 'any phoenix rises from its ashes' is a universal proposition. This is called the *complex* sense of universal. The subject must be taken in the distributive sense and not in the collective sense. Thus, 'All man is all redeemed,' which is Hamilton's 'toti-total proposition,' is not a universal proposition, or assertion *de omni*, in the sense defined by Aristotle in the *dictum de omni*; for it means that the collection of men is identical with the collection of the redeemed, and not that each man without exception is all redeemed. Leibnitz rightly insists that a universal proposition does not assert, or imply, the existence of its subject. The first reason for this is that it accords with the definition; that is, the *dictum de omni*, which is that that is asserted universally of a subject which is said to be predicable of whatever that subject may be predicable. For this may be done without asserting that the subject is predicable of anything in the universe. The second reason is that the term *universal proposition* is a term of formal logic. Now the principal, or at least the most essential, business of formal logic is so to formulate direct syllogism as not to represent it as requiring more or less than it really does. Now the major premise of a direct syllogism must be universal, but need not imply the existence of anything of which the subject should be predicable. Hence a form of universal proposition not asserting the existence of the subject is indispensable. Now that no second kind of universal proposition is needed will presently appear. The third reason is that it is necessary that formal logic should be provided with a form of proposition precisely denying every proposition coming

under each of its simple forms. Now, if a universal proposition asserting the existence of its subject is regarded as a simple form of proposition—as, for example, 'There are inhabitants of Mars and every one of them without exception has red hair'—its precise denial would be a particular proposition not asserting the existence of the subject, which would be a most singular form, hardly ever wanted, and manifestly complex, such as, 'Either there is no inhabitant of Mars, or if there be, there is one at least who has not red hair.' It is obviously far better to make the simple particular proposition assert the existence of its subject, 'There is an inhabitant of Mars who has red hair,' when the universal form will not make the same assertion, or imply it: 'Whatever inhabitant of Mars there may be must, without exception, have red hair.' If every particular proposition asserts the existence of its subject, then an affirmative particular proposition *implies* the existence of its predicate also. It would be a contradiction in terms to say that a proposition *asserted* the existence of its predicate, since that of which a proposition *asserts* anything is its subject, not its predicate. But perhaps it is not quite accurate to say that the particular proposition *asserts* the existence of its subject. At any rate, this must not be understood as if, in such assertion, *existence* were a predicate not implied in a proposition which does not make this assertion (see Kant, *Krit. d. reinen Vernunft*, 1st ed., 599).

Every proposition refers to some index: universal propositions to the universe, through the environment common to speaker and auditor, which is an index of what the speaker is talking about. But the particular proposition asserts that, with sufficient means, in that universe would be found an object to which the subject term would be applicable, and to which further examination would prove that the image called up by the predicate was also applicable. That having been ascertained, it is an *immediate inference*, though not exactly *asserted* in the proposition, that there is some *indicable object* (that is, something *existent*) to which the predicate itself applies; so that the predicate also may be considered as referring to an index. Of course, it is perfectly legitimate, and in some aspects preferable, to formulate the particular proposition thus: 'Something is, at once, an inhabitant of Mars and is red haired,' and the universal proposition thus: 'Everything that exists in the universe is, if an inhabitant of Mars, then also red haired.' In this case, the universal proposition *asserts* nothing about existence; since it must already be well understood between speaker and auditor that the universe is *there*. The particular proposition in the new form asserts the existence of a vague something to which it pronounces 'inhabitant of Mars' and 'red haired' to be applicable. See the remarks on 'existence' under PROPOSITION.

The universal proposition must be understood as strictly excluding any single exception. It is thus distinguished from the proposition 'The ratio of the number of *A*'s to that of the *A*'s that are *B* is as 1 : 1,' not merely in being distributive in form instead of collective, but also in asserting much more. Thus the ratio of the multitude of all real numbers to those of them that are incommensurable is as 1 : 1; yet that does not prevent the commensurable numbers from existing, nor from being infinite in multitude. Were it proved that the ratio of frequency of all events to such of them as were due to natural causation was 1 : 1, that would be no argument whatever against the existence of miracles; although it might (or might not, according to circumstances) be an argument against explaining any given event as miraculous, if such a hypothesis can be called an explanation. Now induction may conclude that the ratio of frequency of a specific to a generic event is 1 : 1, in the same approximate sense in which all inductive conclusions are to be accepted. Indeed, the ratios 1 : 1 and 0 : 1 may be inductively concluded with stronger confidence in their accuracy than any other ratio can be so concluded. But under no circumstances whatsoever can induction establish the accuracy or approximate accuracy of a strictly universal proposition, or that any given series of phenomenal events is, properly speaking, general (and therefore represents a possibly infinite class), or is even approximately general. Such propositions, outside of mathematics (taking this word so as to include all definitions and deductions from them), must either be entirely unwarranted, or must derive their warrant from some other source than observation and experiment. It might conceivably be established by testimony, as, for example, by a promise by a possibly immortal being to act in a certain way upon every occasion of a certain description; and thus it would not need to be an *a priori* judgment. (C.S.P.)

(4) The logical use (3) passes easily into the metaphysical. Provided the common attribute is regarded as important or essential, provided it is regarded as constituting a 'natural' genus or class, it expresses the *essence* of the thing under consideration—its permanent and abiding reality as distinct from transitory accidents. But since this essence is also what is *common* to a number of individuals, the class itself taken as an objective whole is regarded as a universal. When a predicate of this sort is applied to a subject, it expresses not merely an empirical, but a necessary, application to the whole of the subject-matter; the relationship ceases to be simply a quantitative one, and becomes qualitative or essential; e.g. 'All swans are white' would be a quantitative universal judgment, and so empirical. But 'all events must have a cause' is a qualitative universal—it is the 'essence' of an event to be caused. Now mediaeval thought was thus led to identify the universalia or generic notions with essences and with classes. Thus arose the discussion regarding the relation of universals to individual things (see REALISM, 1). Cf. ABSTRACT IDEAS.

(5) Aristotle had illustrated the common as the basis of a 'natural' class, by the common strain in various members of a family—those of common descent. This aspect of the term tends to identify the universal not merely with the static qualities or essence, but with the productive force—the generic is the generative—by which numerically distinct individuals are really connected with one another. This meaning presents a picture of what is meant by the objective reality of a universal. With modern science and the growth of the conception of force, causation, and the tendency to define (as in geometry) by reference to mode of production, this dynamic sense got the upper hand of the static. It is used in this sense in the school of Hegel to mean the general which, as function or activity, exists only in the specific differences to which it determines itself. (J.D.)

(6) Kant, in sundry places (as in *Logik* by Jäsche, § 21), draws a rather insignificant distinction between 'generale' or 'gemeine' Sätze and 'universale' or 'allgemeine' Sätze. The former are what are ordinarily called universal propositions. The latter are something more, apparently relating to any object whatsoever.

(7) Descartes, Leibnitz, Kant, and others appeal to the universality of certain truths as proving that they are not derived from observation, either directly or by legitimate probable inference. There is only one such passage in Descartes; and even Leibnitz, though he frequently alleges the *necessity* of certain truths (that is, their being propositions of necessary mode) against Locke's opinion, yet in only one place (the 'Avant-Propos' of the *Nouveaux Essais*) distinctly adds the criterion of universality. Descartes, Leibnitz, and Kant more or less explicitly state that that which they say cannot be derived from observation, or legitimate probable inference from observation, is a universal proposition in sense (3), that is, an assertion concerning every member of a general class without exception. Descartes (*Letter* xcix) argues that no legitimate inference can be made from external phenomena to the proposition that 'Things equal to the same are equal to each other,' since that would be to infer a 'universal' from a 'particular.' Leibnitz uses almost the same language: 'D'où il nait une autre question, savoir, si toutes les vérités dépendent de l'expérience, c'est-à-dire de l'induction et des exemples, ou s'il y a un autre fondement. . . . Or, tous les exemples qui confirment une vérité générale, de quelque nombre qu'ils soient, ne suffisent pas pour établir la nécessité universelle de cette même vérité: car il ne suit pas que ce qui est arrivé arrivera toujours de même.' Kant expresses himself still more unmistakably (*Krit. d. reinen Vernunft*, 2nd ed., Einleitung, ii): 'Erfahrung giebt niemals ihren Urtheilen wahre und strenge, sondern nur angenommene und comparative Allgemeinheit (durch Induction), so dass es eigentlich heissen muss: so viel wir bisher wahrgenommen haben, findet sich von dieser oder jener Regel keine Ausnahme. Wird also ein Urtheil in strenger Allgemeinheit gedacht, d. i. so, dass gar keine Ausnahme als möglich verstattet wird, so ist es nicht von der Erfahrung abgeleitet, sondern schlechterdings *a priori* gültig. Die empirische Allgemeinheit ist also nur eine willkührliche Steigerung der Gültigkeit, von der, welche in den meisten Fällen, zu der, die in allen gilt, wie z. B. in dem Satze: alle Körper sind schwer; wo dagegen strenge Allgemeinheit zu einem Urtheile wesentlich gehört, da zeigt diese auf einem besonderen Erkenntnissquell derselben, nämlich ein Vermögen des Erkenntnisses *a priori*. Nothwendigkeit und strenge Allgemeinheit sind also sichere Kennzeichen einer Erkenntniss *a priori*, und gehören auch unzertrennlich zu einander.' But notwithstand-

ing the fact that the whole logic of all these writers, especially Kant, requires the word universal to be understood in that sense, yet there are, in the works of all of them, some passages which lend a certain colour of excuse to the stupid blunder of some interpreters who teach that by necessity they mean the irresistible psychical force with which the proposition demands our assent, and that by universality they mean catholicity, i.e. the catholic acceptance of it *semper, ubique, et ab omnibus.* Descartes in particular, and Leibnitz in some measure, perhaps even Kant (though it would be very illogical for him to do so), did more or less attach weight to the irresistible apparent evidence, and to some degree to the catholic acceptance, of propositions as tending to persuade us of their truth; but not as criteria of their origin. It is, however, to be noticed that false interpreters of Kant have used the word universal in the sense of being accepted by all men—the sense of κοινός in the phrase κοιναὶ ἔννοιαι.

The words universal and universality enter into various technical phrases:—

Aesthetic universality: a term of Kant for a universality not formally stated but illustrated by examples.

Complex universality: see above.

Natural universal: a natural sign predicable of a plurality of things, as smoke is a sign of fire. The nominalistic doctrine is that nothing out of the mind is universal in that sense. See Ockham, *Logica*, I. xiv. *ad fin.*

Objective universality: the universality of a concept or rule; a Kantian phrase.

Posterioristic dictum de omni and *Posterioristic universal*: universal predication as defined by Aristotle in the fourth chapter of the first book of the *Posterior Analytics*, where it is defined as the negative of the particular: Κατὰ παντὸς μὲν οὖν τοῦτο λέγω ὃ ἂν ᾖ μὴ ἐπὶ τινὸς μὲν τινὸς δὲ μὴ μηδὲ ποτὲ μὲν ποτὲ δὲ μή—'I call that universally predicated (*de omni*) which is not in something, in something not, nor now is, now is not.'

Prioristic dictum de omni and *Prioristic universal*: universal predication as defined by Aristotle at the end of the first chapter of the first book of the *Prior Analytics*: Λέγομεν τὸ κατὰ παντὸς κατηγορεῖσθαι ὅταν μηδὲν ᾖ λαβεῖν τῶν τοῦ ὑποκειμένου καθ' οὗ θάτερον οὐ λεχθήσεται—'We say that anything, *P*, is predicated universally (*dictum de omni*) when nothing can be subsumed under the subject of which *P* is not intended to be predicated.'

Simple universality: the generality of a general term. See (1) above.

Universal cause: a cause which with one and the same efficiency concurs with others in producing different effects. The idea is that 'particular causes,' that is, finite beings, generate only their own kind. But God and heaven produce all sorts of results natural and moral in one and the same manner.

Universal consent: catholicity (see above).

Universal conversion: the conversion of a proposition into a universal proposition. See Hamilton, *Lect. on Logic*, Appendix V, iii. footnote 14.

Universal grammar: grammar so far as it applies to every possible language. The ordinary doctrine of the middle ages was that in its main features, and even in great detail, one grammar was common to all languages. See Thurot, in *Notices et Extraits*, xxii. 125 ff.

Universal logic: the unusual division of logic into a universal and a particular part is due to Avicenna, who makes the former to consist of the matter of the *Predicaments*, *Peri hermeneias*, and *Prior Analytics*, while the latter, treating of special kinds of reasoning, demonstrative, probable, and sophistical, embraces the matter of the *Posterior Analytics*, *Topics*, and *Sophistici Elenchi*. Kant uses precisely the same division in the introduction to the transcendental logic (*Krit. d. reinen Vernunft*, 1st ed., 53).

Universal moods of syllogism: those in which both premises and the conclusion are universal.

Universal parts and whole: the parts and whole of the logical breadth of a term, proposition, or argument.

Universal unity is that sort of unity which belongs to generalness. Burgersdicius (*Instit. Metaph.*, I. xiii. § 1) explains it in these words: 'Unitas universalis est quae convenit rebus quatenus indivisae sunt in plures res eiusdem nominis et essentiae, et apta in eas dividatur. Universalitas enim haec duo postulat, unitatem sive indivisionem, et communitatem sive aptitudinem ad divisionem et multitudinem. Sic *animal*, ut est universale, in se *unum* est, una enim definitione potest explicari, et aptum est dividi in hominem et bestiam.'

Universal validity: according to some logicians is the validity of such reasonings as are 'calculated to operate conviction on all reasonable minds' (Hamilton, *Lect. on Logic*, xxvi). If he had omitted the word reason-

able, and said 'calculated to work conviction on all minds,' this would not have proved they had any validity at all; for the validity of a reasoning depends upon whether it really will lead to the truth, and not upon whether it be believed that it will. Thus the word reasonable is the only pertinent word in the definition. But in fact there is no division of logical validity into universal and particular.

Universal ante rem: Albertus Magnus, in his commentary on the *Organum*, which is valuable on account of being largely drawn from Algazeli, Alfarabius, and Avicenna (*Liber de Praedicabilibus*, chapter beginning, 'Quamvis autem haec determinata sint supra vires logicae'), says after an explanation too long to quote: 'Et hoc est quod dixerunt antiqui, triplices esse formas, *ante rem*, scilicet, quae sunt formae secundum se acceptae principia rerum existentes, et *in re*, sive cum re ipsa, quae sunt formae existentes in ipsis dantes eis nomen et rationem per id quod sunt aptae esse in multis et universales (non tamen secundum quod sunt in illis; secundum enim quod sunt in illis particularizatae et individuitatae et ad singularitatem ductae sunt). Sunt etiam formae *post rem* quae sunt formae per abstractionem intellectus ab individuantibus separatae, et in quibus intellectus agit universalitatem. Et primae quidem substantialia rerum principia sunt. Secundae autem rerum substantiae. Tertiae autem accidentia et qualitates, quae notae rerum in anima acceptae vocantur et dispositiones vel habitus.' There is much more. They are also called *ante multa*, *in multis*, and *post multa*.

Universal in causando: same as *Universal cause* (above).

Universals in essendo: according to the Conimbricenses are common natures existing in many inferiors. Burgersdicius and others identify them with universals *ante rem*, otherwise called the metaphysical universals, or Platonic ideas.

Universals in praedicando, otherwise called *logical universals*: the universals concerning which the principal dispute between the sects in the 12th century took place. Tataretus, whose tendencies are Scotistic, says: 'Universale in praedicando potest capi dupliciter, uno modo prime-intentionaliter, alio modo secunde-intentionaliter seu pro per se significato. Unde universale prime-intentionaliter captum non est aliud quam aliquid cognitum ut unum in multis et de multis cui ex natura rei non repugnat sic esse, cuius modi sunt significata adaequata terminorum communium. Sed universale secunde-intentionaliter captum non est aliud quam quidam respectus rationis causatus per actum comparativum intellectus comparantis aliquid in ordine ad sua inferiora, ut unum in multis et de multis.'

Universal in significando: a sign which signifies a number of things. The Conimbricenses instance a comet, which presages that many persons are to be seized with maladies, also general words, whether spoken, written, or thought.

Universal per voluntariam institutionem: a term of Ockham's, opposed to natural universal. A conventional sign having a general signification.

Universal simpliciter and *secundum quid*: a proposition is said to be *universal simpliciter* which asserts itself of any individual object of the subject term; that is, an ordinary universal proposition. A proposition is *universal secundum quid* if it is asserted not of every object individually, but of some *representative* (in some definite sense) of each individual, as *Omnia animalia fuerunt in arca Noachi.* (C.S.P., C.L.F.)

Universal Consent or **Catholicity** (in philosophy): see UNIVERSAL, and TESTS OF TRUTH.

Universal Happiness: Ger. *allgemeine Glückseligkeit*; Fr. *félicité universelle*; Ital. *felicità universale.* The 'happiness of the greatest number.' See HAPPINESS, GREATEST HAPPINESS, and ETHICAL THEORIES (Hedonism). (J.M.B.)

Universal Postulate: no foreign equivalents in use. The term is used as a technical one by Spencer, to denote the 'inconceivableness of the negative' of any proposition as the supreme test of the necessary coexistence of a given subject and predicate. It has psychological necessity—the necessity of thinking the proposition in such and such a way; and also logical—the reason for holding it valid. This criterion is in effect nothing but the criterion of RATIONALISM (q. v.) as stated by Leibnitz—the impossibility of the opposite. As such, it was shown by Kant to be applicable only to 'analytic judgments.' Cf. TESTS OF TRUTH. (J.D.)

Universalism: Ger. *Lehre der Universalisten*; Fr. *universalisme*; Ital. *universalismo.* The doctrine of the final salvation of all men, founded by its advocates on the following postulates. (1) God's essential goodness and love; (2) the unlimited scope of Christ's redemption;

(3) the extension of probation beyond death; (4) the perfectibility of human nature.

Universalism was held by some of the early Church Fathers, and found advocates among the reformed thinkers in Germany, France, and England. Its great American apostle was John Murray, who crossed from England in 1770. The creed took institutional form for the first time on American soil, being organized into a church in 1803 at Winchester, New Hampshire, by the adoption of a confession and the acquisition of legal status. It is at present a large and flourishing sect.

Literature: The Universalist Register, Boston; Hosea Biglow, The Ancient Hist. of Universalism; Thayer, Theol. of Universalism (1873); Dodge, The Purpose of God (1894); O. Cone, Gospel Criticism and Historical Christianity (1891). (A.T.O.)

Universalistic Hedonism: Ger. *universalistischer Hedonismus*; Fr. *hédonisme universaliste*; Ital. *edonismo universalista*. The doctrine that the moral end is 'the greatest happiness of the greatest number.' See Ethical Theories (Hedonism), and Utilitarianism. (J.M.B.)

Universality: Ger. *Allgemeingültigkeit*; Fr. *universalité*; Ital. *universalità*. See Universal, and Tests of Truth; and cf. Abstract Idea.

Universe [Lat. *unus*, one, + *vertere*, to turn]: Ger. *Weltall*, *All*; Fr. *univers*; Ital. *universo*. The term is often used as synonymous with World (q. v.), but is distinguished from it by the idea of completeness, all-inclusiveness.

So the German Weltall is distinguished from Welt. It, rather than world, is the equivalent of the Latin Mundus (q. v.). It is sometimes restricted to the entire created system, but is also used, like the Greek one-and-all (ἓν καὶ τὸ πᾶν), to include God as well. In this last sense it is equivalent to nature as used by Spinoza. It is also used in logic to denote the subject or topic taken as a whole —the Universe (q. v.) of discourse. (J.D.)

Universe (the) [Lat. *universum*, combined, from *unus*, one, + *vertere*, to turn]: Ger. (*das*) *Weltall*; Fr. (*l'*)*univers*; Ital. (*l'*) *universo*. (1) The collection of all material things, τὸ πᾶν; the word *universum* occurs in this sense in Cicero.

'Par l'espace,' says Pascal (*Pensées*, i. 6), 'l'univers me comprend et m'engloutit comme un point. Par la pensée, je le comprends.' It is used by some writers to include the spiritual world; by others to include God.

(2) *Universe* (in logic) *of discourse*, *of a proposition*, &c. In every proposition the circumstances of its enunciation show that it refers to some collection of individuals or of possibilities, which cannot be adequately described, but can only be indicated as something familiar to both speaker and auditor. At one time it may be the physical universe of sense (1), at another it may be the imaginary 'world' of some play or novel, at another a range of possibilities.

The term was introduced by De Morgan in 1846 (*Cambr. Philos. Trans.*, viii. 380), but De Morgan never showed that he fully comprehended it. It does not seem to be absolutely necessary in all cases that there should be an index proper outside the symbolic terms of the proposition to show what it is that is referred to; but in general there is such an index in the environment common to speaker and auditor. This De Morgan has not remarked; but what he has remarked has likewise its importance, namely, that for the purposes of logic it makes no difference whether the universe be wide or narrow. The idea of a limited logical universe was adopted by Boole and has been employed by all subsequent exact logicians. There is besides a universe of marks or characters, whenever marks are considered substantively, that is, as abstractions, as they commonly are in ordinary speech, even though the forms of language do not show it. Thus only, there comes to be a material difference between an affirmative and a negative proposition; and a meaning can thus alone be attached to Kant's limitative form of proposition. For it will then alone be one thing to say that an object wants some character common to all men, and another to say that it possesses every character common to all non-men. Only instead of this giving *three* qualities it gives four, for the assertion may be that an object wants some character common to all non-men; a point made by ancient writers.

In 1882 O. C. Mitchell extended the theory of the logical universe by the introduction of the idea of 'dimension' (see Logic, exact, ad fin.). (C.S.P., C.L.F.)

Unknowable (the) [Lat. *in* + *gnoscere*, to know]: Ger. *das Unerkennbare*; Fr. *l'inconnaissable, ce qu'on ne peut connaître*; Ital. *l' inconoscibile*. That which is not and cannot be known; that whose nature is such as to transcend or defy apprehension by any of the processes by which mind apprehends its objects. (J.D.–J.M.B.)

Of cognate terms 'inconceivable' is narrower, being rather equivalent to UNTHINKABLE (q. v.); that is, not to be apprehended by the cognitive or the conceptual processes. 'Incomprehensible' is still narrower, i. e. not to be apprehended mediately or by the discursive processes. (J.M.B.)

The existence of something unknowable is postulated from two different standpoints, one of which (roughly speaking) is that of ancient, the other that of modern thought. In the ancient view it is the essential nature and dignity of being which renders it unknowable; mind and knowledge are derivatives from the absolute reality which accordingly remains ineffably above them. Indeed, this absolute reality is the source of being which it also transcends. It is above distinctions of being and non-being as well as of knowledge and ignorance. This is the attitude of the Neo-Platonists. In modern thought the assumption of the existence of the unknowable is a consequence of the limitations of the faculty of knowledge. Kant, with his thing-in-itself contrasted with the phenomenon; Spencer, with his absolute contrasted with the related; and v. Hartmann, with his identification of the absolute with the unconscious, are the typical representatives of modern conceptions of the unknowable. Such theories differ from those of the agnostics and positivists in that the assertion of the absolute reality as unknowable is an integral part of the system, while in agnosticism and positivism it is a matter of pure indifference whether there be such hyper-phenomenal existences or not. They differ from phenomenalism in that the latter positively deny any such unknowable entity behind the knowable congeries of facts and series of events. (J.D.)

Unproductive Consumption: Ger. *unproduktive Consumption*; Fr. *consommation improductive*; Ital. *consumo non produttivo*. A cost which is not adequately compensated by the RETURN (q. v.).

This definition may be applied either from the private or from the public standpoint; but the latter method is much more common and more useful. If a man spends his income for NECESSARIES (q. v.), as defined in this work, his consumption is productive; i. e. the efficiency outweighs the waste. If he spends it for luxuries (see LUXURY), the case is reversed.

Many of the English economists attempted to confine the term productive to the production of material objects; but this limitation is now regarded as impracticable.

The distinction between productive and unproductive consumption is more important than the distinction between productive and unproductive labour, because the amount consumed furnishes a standard of comparison to determine whether the production is or is not adequate. (A.T.H.)

Unpsychological Ethics: see IDEO-PSYCHOLOGICAL ETHICS.

Unreal [*un* + REAL (q. v.)]: Ger. *unwirklich*; Fr. *sans réalité, irréel*; Ital. *irreale*. Lacking in those marks which to our apprehension or thought constitute REALITY (q. v.). Cf. REAL AND REALITY.

If the possession of such marks constitutes the reality of an object, their lack constitutes its unreality. It is sometimes held, however, that unreality has its own positive marks and is not merely the absence of reality. (J.M.B., G.F.S.)

Unreality: see UNREAL.

Unreality Feeling: see REALITY FEELING.

Unstable Equilibrium (in economics): Ger. *unbeständiges Gleichgewicht*; Fr. *équilibre instable*; Ital. *equilibrio instabile*. A balance of economic motives of such a character that any disturbance of the equilibrium, instead of producing a reaction that tends to drive matters back to the old adjustment, may tend to perpetuate and intensify itself.

The price of an article represents a stable equilibrium when a fall in price forms a motive for contracting the supply. If the conditions of production are such that the competitors must continue to produce at prices much lower than the old point of adjustment (OVERPRODUCTION, q. v.), the price equilibrium is an unstable one, and the value of the commodity is subject to violent fluctuations. (A.T.H.)

Unthinkable (the) [for derivation see THOUGHT]: Ger. (*das*) *Undenkbare*; Fr. (*l'*)*inconcevable*, (*l'*)*impensable*; Ital. (*l'*) *impensabile*. As a technical term the word grows out of Sir William Hamilton's philosophy of the conditioned, especially as developed by Mansel, and borrowed by Herbert Spencer. According to his theory to think is to relate, or to condition. Hence anything which is absolute, or infinite, or unconditioned is, of necessity, unthinkable. It is inconceivable, and hence can be neither affirmed nor denied (Hamilton, *Discussions*, 13–6). (J.D.)

Unwritten Law: Ger. *ungeschriebenes*

Recht, Gemeinrecht; Fr. *droit non écrit*; Ital. *diritto consuetudinario.* (1) All law not made by or under legislative authority.

(2) In English and American law, the common law.

'In legislation both the contents of the rule are devised, and legal force is given to it, by simultaneous acts of the sovereign power, which produce "written law." All the other law sources produce what is called "unwritten law," to which the sovereign authority gives its whole legal force, but not its contents, which are derived from popular tendency, professional discussion, judicial ingenuity, or otherwise, as the case may be' (Holland, *Jurisprudence*, chap. v. 65). Law as formulated by judicial decision, although contained in the official law reports, is unwritten law; it is expository, and not in the nature of an original command by an authorized law-maker (Pollock, *Jurisprudence*, chap. i. 219).

The Roman law, differing from the English, classed as written law all that was received as law and contained in authentic written form, although it might not be derived from legislative authority (*Inst. of Just.*, i. 2, *De iure naturali, gentium, et civili*, 3, 9).

In France, before the Revolution, the Roman law was described as the *Droit écrit*, because it was originally the only form of written law there, and those provinces where it remained in force as common law were termed *pays de droit écrit* (Merlin, *Répertoire de Jurisprudence*, Droit).

Literature: Blackstone, Commentaries, Introd., § 3. (S.E.B.)

Upham, Thomas Cogswell. (1799–1872.) Educated at Dartmouth College and Andover Theological Seminary. Became assistant in Hebrew in the seminary, 1821; ordained as pastor of the Congregational Church at Rochester, N. H., 1823; professor of mental and moral philosophy in Bowdoin College, 1825.

Uprightness [Eng. *up* + *right*]: Ger. *Aufrichtigkeit, Rechtschaffenheit*; Fr. *droiture*; Ital. *dirittura.* The disposition which issues in the habitual practice of virtue; the ethical Disposition (q. v.) as such.

It is opposed to goodness as an emotion which may be capricious, and to legality as observance which may not be ethical. (J.M.B.)

Use [Lat. *usus*]: Ger. (1) *Zweck*, (2) *Nutzen*, (3) *Gebrauch*; Fr. (1) *emploi*, (2) *utilité*, (3) *usage*; Ital. *uso.* (1) The end for which a thing is the appropriate means; as 'the use this is put to, or good for.'

(2) Utility (q. v., various topics).

(3) Actual employment or operation. Cf. Use and Disuse. (J.M.B.)

Use and Disuse: Ger. *Gebrauch und Nicht-Gebrauch*; Fr. *usage et désuétude* (Delage); Ital. *uso e disuso.* The actual employment or non-employment of a character or function more or less habitually in daily life.

Employed to indicate the part a function or character plays in the life and development of an individual creature and also as possibly affecting the next generation (cf. Use-inheritance). (J.M.B., E.B.P.)

Use-inheritance: Ger. *Gebrauchsvererbung, Erbübung* (K.G.); Fr. *hérédité par l'usage* (Delage); Ital. *ereditarietà dall' uso.* Suggested by Ball for the Lamarckian theory (cf. Lamarckism) which holds that the effects of Use and Disuse (q. v.) of organs, or individually acquired Modifications (q. v.) generally, are inherited. See Ball, *Are the Effects of Use and Disuse inherited?*

It is important to distinguish what is called 'definite' inheritance of particular effects, or true heredity, from the transmission of 'general effects' (on the distinction see Ewart, Pres. Address, *Nature*, Sept. 12, 1901). The latter all admit; but not the former. See Acquired and Congenital Characters, and Heredity. Cope proposed (*Prim. Factors of Organic Evolution*, 192) the terms 'Genesiology' for the science of heredity, 'Ctetology' for that of acquired characters, and 'Kinetogenesis' (development by motion) for use-inheritance; but none of them is in common use. (J.M.B., C.Ll.M.)

Usucaption: see Prescription.

Usufruct [Lat. *usufructus*]: Ger. *Niessbrauch*; Fr. *usufruit*; Ital. *usufrutto.* A right during a certain time to the fruits of property belonging to another; a personal servitude, extending to the use and enjoyment of property for a certain term, without otherwise diminishing its substantial value.

A usufruct in land gave rights much like those of a tenant by lease in Anglo-American law.

'Usufructus est ius alienis rebus utendi, fruendi, salva rerum substantia' (*Dig.*, vii. 1, *De usufructu*, 1). Being a personal servitude, it died with the person, nor could he during his life transfer it to another.

It may be created by private grant, or by law as an incident of *status*, e. g. that of a parent (*Code Civil français*, Art. 384, 578 ff.). (S.E.B.)

Usury [Lat. *usura*, a charge for use]: Ger. *Wucher*; Fr. *usure*; Ital. *usura*. An exorbitant rate of interest.

In mediaeval times the name usury was applied to all payments for loans in excess of the return of the principal; while INTEREST (q. v.) was a phrase to justify certain specially excusable forms of usury. To-day, interest has become the general term, and the name usury is applied only to the specially unjustifiable cases of interest taking. (A.T.H.)

Uti possidetis (in international law) [Lat.]. The principle that the party in possession should be protected.

The term is generally used to describe a provision in a treaty, after a war, that conquered territory shall remain in the hands of the conqueror, either provisionally or permanently (see Calvo, *Le Droit international*, § 3150).

Uti possidetis ('as you possess') was the name given to one of the interdicts, or legal processes, of Roman law. It ran in favour of a possessor of land, to protect him against forcible dispossession by one claiming under an adverse title (*Dig.*, xliii. 17, *Uti possidetis*). (S.E.B.)

Utilitarianism: Ger. *Utilitarismus*; Fr. *utilitarisme*; Ital. *utilitarismo*. The ethical theory which regards adaptation to an end as the criterion of moral worth, the end being interpreted as the general happiness. Those who uphold this theory are called utilitarians.

'By the principle of utility,' says Bentham, 'is meant that principle which approves or disapproves of every action whatsoever, according to the tendency which it appears to have to augment or diminish the happiness of the party whose interest is in question.' 'To this denomination has of late been added or substituted the greatest happiness or greatest felicity principle.' 'The word utility does not so clearly point to the ideas of pleasure and pain as the words happiness and felicity do; nor does it lead us to the consideration of the number of the interests affected. . . . This want of a sufficiently manifest connection between the ideas of happiness and pleasure on the one hand and the idea of utility on the other, I have every now and then found operating, and with but too much efficiency, as a bar to the acceptance that might otherwise have been given to this principle' (*Princ. of Mor. and Legisl.*, chap. i). Mill says he 'has reason for believing himself to be the first person who brought the word utilitarian into use. He did not invent it, but adopted it from a passing expression in Mr. Galt's *Annals of the Parish*.' The term is suggested by Bentham in a letter to Dumont, June 28, 1802 (see *Works*, x. 390). 'The creed which accepts as the foundation of morals utility, or the greatest happiness principle, holds that actions are right in proportion as they tend to promote happiness, wrong as they tend to produce the reverse of happiness' (Mill, *Utilitarianism*, chap. ii). Sidgwick restricts the term utilitarianism to 'Universalistic Hedonism, as taught by Bentham and his successors,' and as distinguished from the Egoistic Hedonism or 'Egoism' of earlier thinkers. 'I have made as marked a separation as possible between Epicureanism or Egoistic Hedonism, and the Universalistic or Benthamite Hedonism, to which I propose to restrict the term Utilitarianism' (*Meth. of Eth.*, 5th ed., 83 f.). 'By Utilitarianism is here meant the ethical theory that the conduct which, under any given circumstances, is objectively right, is that which will produce the greatest amount of happiness on the whole; that is, taking into account all whose happiness is affected by the conduct' (*Meth. of Eth.*, 411, 5th ed.). Cf. ETHICAL THEORIES (with literature). [Sidgwick called himself a 'modified utilitarian.' The school of English utilitarians—Bentham, James Mill, John Stuart Mill—has found its special historian and expositor in Leslie Stephen, *The English Utilitarians* (1900).—J.M.B.] (J.S.)

Utilitarians: Ger. *Utilitarier*; Fr. *utilitaires*; Ital. *utilitaristi*. Upholders of the theory of UTILITARIANISM (q. v.).

Utility (in aesthetics): Ger. *Nützlichkeit*; Fr. *utilité*; Ital. *utilità*. Value belonging to an object because it subserves some external end, as opposed to intrinsic or immediate value.

As an aesthetic principle it is used to explain aesthetic value (beauty) by showing that the beautiful object serves some desirable end (as a column to support a burden), and that its aesthetic value is due to this, wholly or in part. It has been admitted as aesthetic principle chiefly in architecture and the lesser arts—the 'dependent arts.'

Utility has been recognized as contributing to aesthetic value by Socrates, Plato, Home, Fechner, Guyau, and in special relation to natural selection in forming types by Hartmann and Santayana. It was rejected by Kant. See FITNESS (in aesthetics).

Literature: KANT, Critique of Judgment, §§ 2 ff.; FECHNER, Aesthetik (1876), chap.

xv; Santayana, Sense of Beauty (1896), 155 ff.; Hartmann, Aesthetik, ii (Ausg. Werke, 4), 133–86, 594 ff., 599 ff.; Brown, Fine Arts (1891), §§ 127 ff.; Guyau, Les Problèmes de l'Esthétique contemporaine (4th ed., 1897), chap. ii. (J.H.T.)

Utility (in biology): value or advantage accruing to an organism from the possession of a character; the character is said to have utility, while the organism, by reason of the utility, is said to be 'fit' to survive. Cf. Fittest (survival of), Existence (struggle for), and Natural Selection.

Cases in which an organism, organ, or function survives because of its fitness from the point of view of utility are covered by the term utility selection. Natural Selection, Organic Selection, Functional Selection, Germinal Selection, Sexual Selection (see those terms) are all cases of utility selection. Degrees of utility, giving degrees of fitness to the organism, have given rise to the theory of Selection (q. v., in biology) value. (J.M.B., E.B.P.)

Utility (in economics). (1) The power of satisfying human desire.

(2) The measure of such power.

The old term, now obsolete, was 'value-in-use.'

It has been a long-established understanding that 'useful' in economics does not mean 'beneficial.' The most precise way of stating this, and one which implies more than appears upon its face, is, that the measure of utility is to be sought in intensity of motive, and not in quantity of happiness.

A clear understanding of the form in which utility measurement could be expressed was first attained by Jevons (see Final Utility). The writers of the Austrian school of political economy have carried this kind of analysis even further than Jevons. (A.T.H.)

Utility (in ethics): see Utilitarianism.

Utility Selection: see Utility (in biology), and Selection (in biology, ad fin.).

Utopia [Gr. οὐ, not, +τόπος, place]: Ger. *Utopie*; Fr. *Utopie*; Ital. *Utopia*. A place or state of complete perfection or happiness: an imaginary island described by Sir Thomas More in his romance *Utopia* (1516).

This island was perfectly governed and enjoyed perfect liberty and happiness. The term has come to be applied to any similar creations of the imagination, such as Plato's *Republic* and the modern pictures, by George (*Progress and Poverty*) and Bellamy (*Looking Backward*), of ideal social condition. The term carries an insinuation as indicating fanciful rather than logical thought, and thus as applying to the visionary and unpractical. Cf. Socialism, passim. (J.M.B.)

V

Vacherot, Étienne. (1809–97.) Born at Longres, France, he studied at Paris and became professor of philosophy at the Sorbonne in 1839. Attacked by the clerical party for his views, he was for political reasons deprived of his office in 1852, and imprisoned for three months in 1859. In 1871 he was elected member of the National Assembly for the Department of the Seine.

Vacuum [Lat. *vacuus*, empty]: Ger. (*das*) *Leere*; Fr. (*le*) *vide*; Ital. (*il*) *vacuo*, (*il*) *vuoto*. The condition of empty space; space unfilled by matter. Cf. PLENUM, and SPACE.

The concepts of the full (plenum) and the empty (vacuum or void) originated very early in the cosmology of Pre-Socratic Philosophy. The Pythagoreans had asserted the existence of empty space beyond the confines of the world (Zeller, *Pre-Socratic Philos.*, i. 408–69, Eng. trans.). This was necessary in order that there might be movement, since to make room for bodies in motion something would have to be pushed outside the world; it was also necessary to account for the possibility of condensation and rarefaction; also to divide things (even numbers) from one another (i. e. if everything was a plenum there would be of necessity complete homogeneity and no distinction). At the same time, in accordance with the highly realistic character of Pre-Socratic philosophy, empty space was identified with air. Parmenides easily recognizes that air is, and, since it is Being, cannot be regarded as NON-BEING (q. v.), which the void would be. Hence everything is full, and accordingly one and homogeneous and at rest—thus admitting that the Pythagorean assertion of the void as necessary for motion and for distinction and plurality is valid (Zeller, op. cit., i. 506, 633–6). The Atomists accordingly take up the opposite pole of the argument, and in asserting the multiplicity of distinct and moving atoms, assert also the existence of an empty space (*τὸ κενόν*) which separates them and in which they can move about (Zeller, op. cit., ii. 210–20). Empedocles, on the contrary, denied the existence of a vacuum, but supposed that the qualitatively different elements had pores in them, so that the elements are able to mix with one another indefinitely and thus produce the appearance of change and of indefinite variety. Anaxagoras attempts by a more thoroughgoing qualitative mixture of beings to deny the void and yet uphold change and distinction. Plato arrives at the abstract generalization of pure or empty space, which is Non-being, and as the void, the all-receptive (*πανδεχές*) background of the creative energy, which, through being first distinguished into geometrical figures, becomes the framework of the physical world (Zeller, *Plato*, 305–7, Eng. trans.). In the existent physical world there is no void, for the spherical limit of the universe, being continuous, holds all within pressed together (*Timaeus*, 58–60), so that as to nature Plato agrees with Empedocles and Anaxagoras, while returning to the Pythagoreans to get a metaphysical empty space. (This conception of it as correlative to geometry, and thus the mean term between the physical and mathematical, was largely influential in displacing the physico-metaphysical conception of the vacuum by the mathematico-metaphysical conception of pure SPACE, q. v.) Aristotle undertakes an explicit and extensive refutation of the atomic theory of the vacuum: according to him space is the limit of the

including body with reference to the included; and hence, of course, where there is no body there can be no space. Specially ingenious is his statement (against the Atomists) that not the plenum but the void is incompatible with motion. The void would be absolutely homogeneous in all directions, without distinctions of place, and there would be in it, therefore, nothing which could give a body any definite movement (which implies place) and nothing to bring a body ever to rest (Zeller, *Gesch. d. griech. Philos.*, ii. 399–401). Strato agreed with Aristotle in his polemic against the Atomists, but still asserted the void as necessary to account for certain phenomena of light and heat. Outside the world, however, there is no empty space. The Stoics reversed this position. Space within the world is simply the limits of bodies, or the distance between the limits of a body; but beyond the world there exists an absolutely empty and infinite space. After this time, the conception is best treated in connection with that of space, save to remark that Descartes, by identifying matter with extension, reduced the conception of the vacuum to a self-contradictory absurdity. In general, it may be remarked that the conflict regarding plenum and void is part of the larger conflict between a mathematical-logical construction of nature which tends to identify space with the ultimate basis of the material (as Plato and Descartes), and a mechanico-physical one, like Atomism; or, logically, it has to do with the relation of the discrete and continuous; metaphysically, with the question of the finite and infinite. (J.D.)

Vague (in logic) [Lat. *vagus*, rambling, indefinite]: Ger. *unbestimmt*; Fr. *vague*; Ital. *vago*. Indeterminate in intention.

A proposition is vague when there are possible states of things concerning which it is intrinsically uncertain whether, had they been contemplated by the speaker, he would have regarded them as excluded or allowed by the proposition. By intrinsically uncertain we mean not uncertain in consequence of any ignorance of the interpreter, but because the speaker's habits of language were indeterminate; so that one day he would regard the proposition as excluding, another as admitting, those states of things. Yet this must be understood to have reference to what might be *deduced* from a perfect knowledge of his state of mind; for it is precisely because these questions never did, or did not frequently, present themselves that his habit remained indeterminate. (C.S.P.)

Vaiçeshika Philosophy: see Oriental Philosophy (India).

Valentinus. Supposed to be an Egyptian, who lived in Alexandria and Cyprus. Taught in Rome, 140–60 A.D. He was founder of the Gnostic sect of Valentinians. He taught, among many others, Ptolemaeus, Axionicus, Heracleon, and Secundus.

Validity [Lat. *validus*, strong]: Ger. *Gültigkeit*; Fr. *validité*; Ital. *validità*. The possession by an argumentation or inference of that sort of efficiency in leading to the truth, which it professes to have; it is also said to be valid.

Every argument or inference professes to conform to a general method or type of reasoning, which method, it is held, has one kind of virtue or another in producing truth. In order to be valid the argument or inference must really pursue the method it professes to pursue, and furthermore, that method must have the kind of truth-producing virtue which it is supposed to have. For example, an induction may conform to the formula of induction; but it may be conceived, and often is conceived, that induction lends a probability to its conclusion. Now that is not the way in which induction leads to the truth. It lends no definite probability to its conclusion. It is nonsense to talk of the probability of a law, as if we could pick universes out of a grab-bag and find in what proportion of them the law held good. Therefore, such an induction is not valid; for it does not do what it professes to do, namely, to make its conclusion probable. But yet if it had only professed to do what induction does (namely, to commence a proceeding which must in the long run approximate to the truth), which is infinitely more to the purpose than what it professes, it would have been valid. Validity must not be confounded with *strength*. For an argument may be perfectly valid and yet excessively weak. I wish to know whether a given coin is so accurately made that it will turn up heads and tails in approximately equal proportions. I therefore pitch it five times and note the results, say three heads and two tails; and from this I conclude that the coin is approximately correct in its form. Now this is a valid induction; but it is contemptibly weak. All simple arguments about matters of fact are weak. The strength of an argument might be theoretically defined as the number of *independent* equal standard

unit arguments upon the other side which would balance it. But since it is next to impossible to imagine independent arguments upon any question, or to compare them with accuracy, and since moreover the 'other side' is a vague expression, this definition only serves to convey a rough idea of what is meant by the strength of an argument. It is doubtful whether the idea of strength can be made less vague. But we may say that an induction from more instances is, other things being equal, stronger than an induction from fewer instances. Of probable deductions the more probable conclusion is the stronger. In the case of hypotheses adopted presumptively on probation, one of the very elements of their strength lies in the absence of any other hypothesis; so that the above definition of strength cannot be applied, even in imagination, without imagining the strength of the presumption to be considerably reduced. Perhaps we might conceive the strength, or urgency, of a hypothesis as measured by the amount of wealth, in time, thought, money, &c., that we ought to have at our disposal before it would be worth while to take up that hypothesis for examination. In that case it would be a quantity dependent upon many factors. Thus a strong instinctive inclination towards it must be allowed to be a favouring circumstance, and a disinclination an unfavourable one. Yet the fact that it would throw a great light upon many things, if it were established, would be in its favour; and the more surprising and unexpected it would be to find it true, the more light it would generally throw. The expense which the examination of it would involve must be one of the main factors of its urgency.

Returning to the matter of validity, an argument professing to be necessary is valid in case the premises could not under any hypothesis, not involving contradiction, be true, without the conclusion being also true. If this is so in fact, while the argument fails to make it evident, it is a bad argument rhetorically, and yet is valid; for it absolutely leads to the truth if the premises are true. It is thus possible for an argument to be valid and yet bad. Yet an argument ought not to be called bad because it does not elucidate steps with which readers may be assumed to be familiar. A probable deductive argument is valid, if the conclusions of precisely such arguments (from true premises) would be true, in the long run, in a proportion of times equal to the probability which this argument assigns to its conclusion; for that is all that is pretended. Thus, an argument that out of a certain set of sixty throws of a pair of dice about to be thrown, about ten will probably be doublets, is rendered valid by the fact that if a great number of just such arguments were made, the immense majority of the conclusions would be true, and indeed ten would be indefinitely near the actual average number in the long run. The validity of induction is entirely different; for it is by no means certain that the conclusion actually drawn in any given case would turn out true in the majority of cases where precisely such a method was followed; but what is certain is that, in the majority of cases, the method would lead to *some* conclusion that was true, and that in the individual case in hand, if there is any error in the conclusion, that error will get corrected by simply persisting in the employment of the same method. The validity of an inductive argument consists, then, in the fact that it pursues a method which, if duly persisted in, must, in the very nature of things, lead to a result indefinitely approximating to the truth in the long run. The validity of a presumptive adoption of a hypothesis for examination consists in this, that the hypothesis being such that its consequences are capable of being tested by experimentation, and being such that the observed facts would follow from it as necessary conclusions, that hypothesis is selected according to a method which must ultimately lead to the discovery of the truth, so far as the truth is capable of being discovered, with an indefinite approximation to accuracy. (C.S.P., C.L.F.)

Value: see WORTH.

Value (economic) [OF. *value*, from Lat. *valere*, to be worth]: Ger. *Werth*; Fr. *valeur*; Ital. *valore*. An estimate of what a price ought to be.

The word value is used in a number of different meanings, but this idea of a permanent standard or cause of price, as distinguished from a temporary or accidental phenomenon, lies at the basis of them all. Sometimes value is used in the sense of utility; for instance, when we say that an article has a value to the owner out of all proportion to the amount for which he can sell it. This sense of the term was characterized by Smith as 'value-in-use.' Modern writers avoid this term of Smith's, and say 'degree of utility' (Jevons) or OPHELIMITY (q.v., Pareto). The marginal degree of utility, or

value-in-use, is by many called 'subjective value.'

Sometimes value means purchasing power in the abstract as distinct from concrete measures of that power; for instance, we may say that an article has value, though we do not know what its price may be. Sometimes it means purchasing power measured in commodities instead of in money (Fawcett). Sometimes it means average probable price. When we say that a certain article is selling at present below its real value, we may thereby mean that in the long run it will generally command a higher price than at present. But in the commonest sense of the term (which is present in the minds of many reasoners who think they are using other definitions) the word value means a proper and legitimate price as distinct from an unfair or extortionate one. Value thus becomes an ethical term—as distinct from price, which is a purely economic one. A price is a fact; a value, a judgment. A theory of prices puts us in a position to explain the transactions of commercial life; a theory of value undertakes to determine their advisability or morality. Cf. WORTH.

We may thus have as many different theories of value as there are theories of business ethics. But these views fall under two main heads: the commercial theory, which bases value upon what the buyer is willing and able to offer for an article; and the socialistic theory, which bases its estimate of value upon what the article has cost the seller in toil and sacrifice. Down to the time of Jevons the advocates of the socialistic theory had the advantage of offering a clear standard instead of a confused one. There must be, said Aristotle and all the Aristotelians, some common element in the different things whose value is measured one against another; and the only discoverable common element is labour. This, said they, is the real standard. This view was brought out with great emphasis by Karl Marx. But Jevons and his successors, by giving precision to the conception of marginal utility, showed that there was another standard or common element, just as good from a metaphysical standpoint and far more consonant with the facts of commercial life. This so-called Austrian theory of value is nothing more than the commercial theory carried out to its logical conclusion. It holds that the value of an article is the price which it will command under a system of free and intelligent competition. Under these circumstances the market price represents the temporary value of the article, and the 'normal price' its permanent value.

Literature: HADLEY, Economics, chap. iii; MARX, Das Kapital, i. (1867); WIESER, Der natürliche Werth (1889). (A.T.H.)

Value (ethical): see WORTH (ethical).

Value (in physical science). A number or symbol which expresses the amount or measure of a mathematical quantity; especially a quantity represented by an algebraic symbol; that which answers the question how great is a magnitude or how much is a quantity.

It is distinguished from the word quantity in that the latter is used for the concept in general, as time, space, or weight; while value designates the number or symbol which specifies some definite amount of the quantity. Thus, if t represents a time, we should say that 7 seconds, or n seconds, was the value of t in a special case. Cf. QUANTITY. (S.N.)

Vanity: see PRIDE.

Variable Error: see ERRORS OF OBSERVATION.

Variable (and **Constant**) **Quantity** [Lat. *variabilis*, apt to change]: Ger. *variabel*; Fr. *variable*; Ital. *variabile*. A magnitude or quantity which is conceived to be indeterminate or capable of assuming an indefinite number of values, while some other quantities remain constant (called invariables). (S.N.)

If x may have any one of a specified set of values, it is called an *indeterminate*. If, on the other hand, it is supposed to take these values successively in any specified order, it is called a *variable*.

The assemblage of the values which an indeterminate or variable is free to take is sometimes called its *domain*.

Thus if x is free to take any of the values 1, 2, 3, and these only, it is an indeterminate, and the assemblage 1, 2, 3 is its domain; it becomes a variable if we think of it as taking successively the value 1, the value 2, the value 3, the value 1, &c.

We are free at any time to assign to an indeterminate or variable any particular value which belongs to its domain; but it then ceases to be an indeterminate or a variable and becomes a *constant*.

It should be added that the distinction between indeterminates and variables is not always regarded. Both are commonly called variables, and are covered by the definition given above. (H.B.F.)

Variation [Lat. *varius*, different]: Ger. *Variation*; Fr. *variation*; Ital. *variazione*.

(1) CHANGE (q. v.); (2) DIFFERENCE (q. v.). See the other topics VARIATION, also MODIFICATION AND VARIATION (mental), and VARIATIONAL PSYCHOLOGY. (J.M.B.)

Variation (in biology). Diversity or dissimilarity between organs or qualities that are homologous.

The importance of variation in biology depends on the fact that differentiation of organisms, which is the essence of evolution, must originate in individual dissimilarities. Out of one species several can arise just because every species varies in several directions. Some authors use the term variation in a slightly different sense. Starting with the assumption of a stable specific centre or type, variation is, for them, deviation from that type. It is better to adopt the term deviation for this idea of departure from the type, and to reserve the term variation for the broader conception of unlikeness. Variation is sometimes contrasted with MUTATION (q. v.), mutation being employed for such variation as is of phylogenetic importance. But this distinction is a theoretical one which cannot be utilized in ordinary discussions; for we do not always know what variations are and what are not of phylogenetic importance. Variation as an abstract term is not commonly used in the plural. It is, however, common to speak of one variation or more, by which is meant one differing condition or more: we shall let the word variant stand in this meaning. The term 'a variation' (variant) is sometimes confounded with a variety. While a variant is a particular condition, a variety is a community or an incipient species all the members of which deviate in the same direction from the typical species. Thus, the woodland bison is a variety of the American bison.

The variants of organisms are of a number of types, and may be classified in several ways. Perhaps the most significant classification is into trivial variants and sport variants. Trivial variants are the slight differences that distinguish man from man, or one leaf of a tree from another leaf. Sport variants are those great differences that occasionally crop out and impress themselves strongly upon the progeny of the sport. As examples may be cited hornless cattle, hairless mice, and long-tailed horses. The sport variant may be either 'normal' or 'abnormal'; but there is no sharp distinction to be drawn between these words, as we shall see later, for what is abnormal for one species is often normal for another species.

A second method of classifying variants is into meristic and substantive. Meristic variants have to do with the number of parts and their symmetry; whereas substantive variants relate to the actual constitution or substance of the parts themselves. This classification is that of Bateson. It is, however, not altogether satisfactory, because variation in number is frequently correlated with variation in quality. Thus, variation in number of the teeth of mammals is also a variation in quality, and the number of vertebrae in a fish is correlated with the size of the fish. A third method of classifying variants is into integral and graduated. Integral characters are such as can be counted; graduated variants are such as are expressed by measurement; e.g. the spines on the back of a prawn, the grooves on a scallop-shell, the rows of scales on a fish, are integral variants. The stature or weight of man, the colour of the eye, the strength of the arm, are graduated variants. Finally, variation may be either individual or partial. Individual variation deals with the differences between the characters of individuals. Partial variation deals with the differences between the multiple organs of a single individual. For example, the stature of man is a case of individual variation; the diameter of the scales of an individual fish is a case of partial variation.

The method of studying trivial variation is, in general, the method of measurement or of counting, and the statistical treatment of the data so obtained. See VARIATION (statistical treatment of). The method of studying sport variation is rather that of description and comparison. The facts of extra vertebrae and ribs, of supernumerary fingers and toes in man, of extra digits on the horse's leg, first become significant when we compare the abnormal with the normal conditions in other species. For nothing is more striking than the fact that what is abnormal for one species is often normal for some other. The human abnormality of thirteen ribs is a normal condition in the chimpanzee. The hairless house-mouse finds its counterpart in Heterocephalus, a hairless rodent of South Africa.

The two classes of variation, trivial and sportive, have distinct meanings for evolution. Trivial variation is universal, and that very universality makes it *a priori* probable that it has a significance for evolution. The modern selectionist believes that it affords sufficient material to permit, in time and under careful selection, of all those differences

among animals and plants with which we are acquainted. In favour of the theory that evolution takes place by the selection of the ordinary fluctuations about the type, we have (*a*) the experience of breeders of domesticated animals and plants, (*b*) the facts of specific or racial difference among some animals in nature, and (*c*) certain facts of paleontology. (*a*) The experience of breeders demonstrates that extremely careful selection of minute differences can bring about considerable changes. We see in America the process of selection taking place at fanciers' shows, where each animal is scrutinized with great care, its 'defects' or deviations from an ideal type marked against it on a score card, and then the individual having fewest defects given a prize, as a result of which the price it can command for breeding purposes is greatly increased. Within a few generations any ideal, within limits, provided it remains constant, can be reached. As a result of selection, the proportion of sugar in the sugar beet has been raised unit by unit, from ten per cent. to eighteen per cent. and over. But the process has been a slow one. (*b*) The fact that the variation of certain animals is correlated with their distribution in nature supports the view of the importance of trivial variation in evolution. As we pass from the east coast to the north-central States of America we find the individuals of various species of birds, mammals, and insects changing gradually from section to section. This has been shown for the fox squirrel, for certain mice, for wasps, and various other insects. There is little question but that climatic conditions have caused the variation in these cases. The qualities of colour are as graduated as the climate is. (*c*) Many paleontologists are able to construct series of fossils showing almost infinitesimal gradations from one species to others; and some prominent paleontologists have been led by the facts of their science to conclude that evolution proceeds by the selection of trivial variants. In view of all this evidence we can hardly deny the importance that such selection has for evolution.

Yet these trivial variants are not the only ones that play a rôle in evolution. De Vries (1901) has gone to the extreme of denying that trivial variations have any part to play in the origin of species. The improvement of the sugar beet has not made a new species of it. The moment selection, by which the improved condition is maintained, is abandoned the form reverts to the primitive condition. The improvement of races of poultry or pigeons does not even carry us outside the race with which we started. Although the evidence is historically deficient, it is highly probable that the most striking characters of our domestic fowl have arisen suddenly as sports, which have been preserved by selection. Thus the Dorking fowl is polydactyl, the Polish fowl has a cerebral hernia, the Bantam breed is a dwarf, the rumpless fowl has a monstrous tail, the frizzled fowls have feathers that curl backwards, the sooty fowls are melanic. Darwin himself suggests the origin of these races from sports. He says (*Variation of Animals and Plants under Domestication*, i. 242), 'Fanciers . . . do not sufficiently regard the probability of the occasional birth, during the course of centuries, of birds with abnormal and hereditary peculiarities,' &c.

But we have more direct evidence in the known origin of varieties of plants from sports or 'bud variations.' Thus the nectarine arose suddenly from the peach; likewise the willow-leaved English cherry arose as a sport. Indeed, such a practical as well as theoretical horticulturist as Bailey (as below, 118) says, 'The person who is wishing for new varieties should look critically to all perennial plants . . . for bud variations or sports.' Bateson (as below) has laid great stress on sports as of phylogenetic importance among animals. He finds that in many cases the measurement of an organ fluctuates not about one mode merely, but about two, intergrades being few in number. Thus variation is often discontinuous, and this discontinuity is the beginning of that discontinuity which is typically found between two 'good' species. For example, Bateson finds that the length of the forceps in a lot of earwigs gathered in one restricted locality (Farne Islands) fluctuates about two centres or 'modes' at 3·5 mm. and 7 mm. respectively. I was interested to see whether naturalists have actually found distinct species of earwigs which differed chiefly in the length of the forceps. The recent synopsis of the Forficulidae by Bormans and Krauss (1900) afforded the opportunity. I find repeated cases where closely related species, inhabiting neighbouring but not coincident districts, are distinguished chiefly by the circumstance that the male in the one case has long forceps and in the other case short ones. Thus the potentiality of two species displayed by the earwigs of the Farne Islands has become realized in other species. Likewise, there is

in plants a tendency towards discontinuity in variation: for Ludwig has shown that the ray-flowers of the Compositae tend to group themselves around certain centres. That paleontological evidence cannot be called in to support the view of saltatory evolution is due, not to the fact that great breaks do not occur between fossil species (for such breaks are indeed the prevailing thing), but rather because it cannot be denied that intergrades may have existed.

[For the opposed view that 'sports' have little place in evolution, see MUTATION, and cf. NATURAL SELECTION.—J.M.B.]

Laws of Variation. These have been formulated by Darwin, and some have been added more recently by Bateson.

(1) *No part varies alone, but always in correlation with some other part.* This law of correlation in variation is of the greatest importance. It was early recognized by the French anatomists, and was the basis of their laws of compensation and balancing of growth, and was the justification of Cuvier's attempt to reconstruct the skeleton of an entire animal from a few bones. That Cuvier met with so little success was due rather to his lack of knowledge than to any difficulty in the law of correlation. Recently a method of measuring correlation exactly has been worked out by Galton and improved by Pearson. See VARIATION (statistical treatment of). We can now express precisely the degree of correlation and its sense, whether direct or inverse, between any two measured organs. And so far it appears that there is correlation between almost all organs of the body, even those that are morphologically remote. The index of correlation is an index of morphological kinship or of physiological interdependence.

(2) *Multiple, rudimentary, and lowly organized structures are especially variable.* Bateson has added the law that *the organs that stand at the end of a series are more variable* than those that occupy a middle position; for example, the back molar teeth of man are the most variable of the molars, also the last of the gill-slits of vertebrates, and the extremes in the series of ocellar markings of butterflies.

(3) *A part developed in any species in an extraordinary degree or manner, in comparison with the same part in allied species, tends to be highly variable.* This law has been tested quantitatively by W. L. W. Field (1898), in the case of the corrugated margin—an extraordinary character—of the hawk-moth, *Thyreus Abbotti*. The corrugated margin was found to be the most variable dimension of the wing.

(4) *Specific characters are more variable than generic ones.* This has been tested quantitatively by E. T. Brewster, who has found that it holds in a large series of cases of human dimensions, as well as those of the lower animals.

(5) *The species of large genera and those species that have a wide range are especially variable.*

(6) *Secondary sexual characters are highly variable.* Darwin refers especially to the greater variability in the plumage of male gallinaceous birds, which exhibits marked sexual characters,—the females of these birds being without marked sexual plumage.

(7) *The variations of one species are often in the direction of a second species or of an ancestral species.* The latter phenomenon is very commonly seen when breeding domesticated animals, and is called reversion.

(8) *Abnormal outgrowths of bilaterally symmetrical animals tend to be symmetrical and often double.* Bateson has shown this to be true for the appendages of Crustacea and insects and for mammalian bones.

The foregoing laws are still empirical. The work of the future is not merely to multiply such laws, but to simplify their expression.

The causes of Variation. Under this head Bateson in his great work on variation has only the remark: 'Inquiry into the causes of variation is as yet, in my judgment, premature.' We can, in the opinion of the present writer, state certain causes of variation with the express reservation that they are not universal causes, but only partial ones.

(*a*) *The size of organs increases with use and diminishes with disuse.* This is a well-known fact, but the degree of dependence in any case has not been exactly determined, and it is an unsettled question whether the fact has any phylogenetic significance [i.e. by HEREDITY (q.v.) or otherwise: cf. ORGANIC SELECTION.—J.M.B.].

(*b*) *External factors, especially climate, modify the individual,* particularly its superficial colour. Cases have been already cited illustrating this law. The effect of poor nutrition is especially marked in the case of plants.

(*c*) *Crossing and hybridizing bring about new combinations* and are thus causes of variation. Often the combinations are not strictly intermediate between the parents, but are

in accordance with the law of reversion and other less well-recognized laws.

(*d*) *The very complexity of the developmental processes makes it impossible that the course of development should ever be twice exactly alike.* This is sufficient to account for trivial variation, which follows the law of probability. Some individuals fall short of the specific mode, others develop beyond it. Thus the variants may be merely different ontogenetic stages (Eimer).

All causes of variation fall, indeed, into three general categories; namely, causes inherent in the germ-plasm; causes dependent upon the complexity of the developmental processes; and external causes. The external causes act either directly—that is, chemically or physically—or indirectly as stimuli to which the protoplasm responds by more or less adaptive modifications. We cannot deny, in fact there is some reason for thinking, that all three of these categories take part in evolution; but the first and third are doubtless the more effective. (C.B.D.)

In the treatment of variation, confusion arises from failure to distinguish the following forms: (*a*) 'indefinite,' 'fortuitous,' or 'ataxic' (subject to 'chance' or following the law of probability); (*b*) 'definite' or 'determinate' (in some respect not following the law of probability as respects distribution). The latter may well be again divided into (1) 'autotaxic' (determinate variation due to intrinsic vital tendencies to development, as held by all forms of vitalism), and (2) 'taxonomic' (determinate variation caused by external causes of any sort). (J.M.B.)

Literature: L. H. Bailey, Plant-Breeding (1896); W. Bateson, On some Variations of *Cardium edule* apparently connected with the Conditions of Life, Philos. Trans. (1890), and Materials for the Study of Variation treated with special regard to Discontinuity in the Origin of Species (1894); E. T. Brewster, A Measure of Variability, &c., Proc. Amer. Acad. Arts and Sci. (1897), xxxii. 268–80; E. D. Cope, Primary Factors of Organic Evolution (1896); C. Darwin, On the Origin of Species by means of Natural Selection (6th ed., 1872), and The Variation of Animals and Plants under Domestication (2nd ed., 1875); C. B. Davenport, Statistical Methods with special Reference to Biological Variation (1899); G. Duncker, Die Methode der Variationsstatistik, Arch. d. Entwickelungsmech. d. Organismen (1899), viii. 112–83; Y. Delage, La Structure du Protoplasma (1895); W. L. W. Field, A Contribution to the Study of Individual Variation in the Wings of Lepidoptera, Proc. Amer. Acad. Arts and Sci. (1898), xxxiii. 389–95; F. Galton, Correlations and their Measurement, chiefly from Anthropometric Data, Proc. Roy. Soc. Lond. (1888), xlv. 136–45, and Natural Inheritance (1889); F. Ludwig, Ueber Variationskurven und Variationsflächen der Pflanzen, Bot. Centralbl. (1895), lxiv. 1–8 ff., and Die pflanzlichen Variationskurven und die Gauss'sche Wahrscheinlichkeitskurve, Bot. Centralbl. (1898), lxxiii. 241–50; C. von Naegeli, Mechanisch-physiol. Theorie d. Abstammungslehre (1884); K. Pearson, Mathematical Contribution to the Theory of Evolution, Philos. Trans. Roy. Soc. London, i–x. (1894–1901); D. Rosa, La riduzione progressiva della variabilità e i suoi rapporti coll' estinzione e coll' origine delle specie (1899); W. B. Scott, On Variations and Mutations, Amer. J. of Sci. (1894), xlviii. 355–74; H. de Vries, Die Mutationstheorie, i. 1.–3. Lief. (1901); A. Weismann, Essays upon Heredity and kindred Biol. Problems (Eng. trans., 1890–2); Ewart, Pres. Address, Nature, Sept. 12, 1901, 482. (C.B.D.)

Variation (statistical treatment of). Cf. Variation (in biology).

The characters by which a species of animals is defined are chosen by zoologists in one of two ways. In describing a species, of which many individuals can be examined, some attempt is made to formulate a plan of structure, common to all individuals of the species, and differing from that found among individuals of other species. In the case of rare species, the description is often a mere statement of the chief characters which distinguish a single individual from individuals of other species. The result in either case is the establishment of a mental diagram or 'type,' which can be compared with other mental diagrams of the same kind (cf. Huxley, *The Crayfish*, 1880, chaps. v, vi). For purposes of classification, and for most of the purposes of comparative morphology, these mental 'types' of species are necessary and sufficient; for other purposes they are altogether inadequate.

In a large series of individuals belonging to the same race or species, probably every one presents a general resemblance to the 'type,' but no single individual is *exactly* like it, each one differing from the type and from its fellows by larger or smaller peculiarities. Such individual peculiarities are called variations. The production of variations is a per-

fectly normal process, so that a race or species is characterized not only by the occurrence of a prevalent structural type, but by the extent and frequency of deviations from that type. In many cases it is possible to find a formula which expresses with considerable accuracy both the type and the variability of a species under given conditions of life. Such a formula will probably be found for all cases of variation; and it forms the proper basis for the study of selection, inheritance, and other factors of the process of evolution. The statement of the typical character of a species should also be based upon it.

Determination of the type. The 'typical' condition of a character in a species may be determined in various ways, which may be illustrated by an example. The prawn (*Palaemonetas varians*) occurs abundantly in fresh and brackish water throughout Europe. Examination of 1,434 specimens (male and female) from a small estuary near Plymouth (England) showed the following result:

3	individuals had	7	dorsal teeth.
89	,,	6	,,
681	,,	5	,,
533	,,	4	,,
103	,,	3	,,
23	,,	2	,,
2	,,	1	,,

For many descriptive purposes it is useful to take as the type the condition which occurs most frequently, or the *mode* (Pearson), which is in this case about five teeth. For other purposes it is convenient to take the *mean* or *average*. In the 1,434 prawns recorded, there were altogether 6,449 dorsal teeth; the sum of all the dorsal teeth, divided by the number of prawns, gives the *mean* number of teeth, or the number which each prawn would have if the whole number of teeth in the group were equally divided among the individuals. In this case $\frac{6449}{1434} = 4{\cdot}497$; and since any projection from the rostrum is called a tooth, this is an example of the very numerous cases in which individuals exactly like an average or mean type cannot occur. Another way of determining the type, which is useful in many cases, is to arrange all the individuals in order according to the condition of some character, and to determine the condition of that character in the individual at the middle of the series. The *median* value, obtained in this way, is intermediate between the *mean* and the *modal* values, except in special cases. (For examples of the use of median values see especially Francis Galton, *Natural Inheritance*, 1889, and various papers by the same writer in *Proc. Roy. Soc.*)

The difference between the *mean* and the *modal* type is sometimes greater than in the case just mentioned. The clover (*Trifolium repens*) gives rise occasionally to flowers in which one or more florets are raised above the rest, by a prolongation of the axis of the flower. In a series examined by De Vries:

325	flowers had	0	florets raised	above	the rest.
83	,,	1	,,	,,	,,
66	,,	2	,,	,,	,,
51	,,	3	,,	,,	,,
36	,,	4	,,	,,	,,
36	,,	5	,,	,,	,,
18	,,	6	,,	,,	,,
7	,,	7	,,	,,	,,
6	,,	8	,,	,,	,,
1	,,	9	,,	,,	,,
1	,,	10	,,	,,	,,

The *modal* number of raised florets is nearly 0; but the *mean* number is 1·454; and in this case a description, in which the *mean* is taken as the 'type,' conveys a totally different impression from a description of the *modal* type. The *median* type lies, of course, between these extremes.

When the variations from the type are distributed with sensible symmetry, the values of the *mean*, *median*, and *modal* types sensibly coincide. Examples of this condition are frequent in human characters (cf. Galton, loc. cit.; Quetelet, *Lettres sur la Théorie de Probabilité*, 1846, and others). J. H. Baxter has given measurements of the height of 25,878 recruits in the United States army; and in these men the *mean*, *modal*, and *median* heights are all sensibly 66·7 inches. (The table is too long for insertion. Cf. *Medical Statistics of the Provost-Marshal-General's Bureau*, i, 1875, and for a discussion cf. Pearson, *Philos. Trans.*, 1895, A, 385.)

The majority of races agree with the examples cited, in the fact that there is *only one modal type* (at least for each sex). In some animals and plants, however, there are two or more conditions of 'maximal' frequency in every race; examples are the long- and short-styled forms of many species of *Primula*, the two forms of male in many arthropods, the three forms of flower in the loosestrife (*Lythrum salicaria*), and many others. In some plants especially there seems to be a tendency to the production of a great number of 'modes.' As an example may be quoted the number of flowers with a given number of ray florets in 17,000 specimens of *Chrys-*

anthemum inodorum, counted by Ludwig (*Botanisches Centralbl.*, lxiv, No. 1, 1895).

Ray Florets.	Frequency.	Ray Florets.	Frequency.
43	2	24	812
42	3	23	1147
41	0	22	1790
40	14	21	3650
39	16	20	1568
38	16	19	856
37	28	18	625
36	24	17	525
35	186	16	479
34	346	15	455
33	307	14	383
32	187	13	427
31	183	12	148
30	196	11	65
29	294	10	36
28	377	9	13
27	375	8	9
26	614	7	2
25	602		

These cases of multimodal variability cannot at present be described by any statistical formula, and they will therefore be neglected in what follows. It is important to remember that they exist, and that a statistical theory which fails to include them is incomplete.

Deviations from the type. In attempting to find a measure of the frequency and extent of deviations from the type, it is convenient to take the *mean* value of the character as type, rather than the *modal* or *median* value, when the three do not coincide. The methods adopted may be best illustrated by an imaginary example, chosen for simplicity of computation. Consider, therefore, three bundles of sticks, *A*, *B*, and *C*, each containing fifty sticks; and let sticks of various lengths occur in each bundle with the frequencies given in the table:

Length.	No. of sticks of given length.		
	A	*B*	*C*
16 inches	1	6	–
15 ,,	6	2	7
14 ,,	10	3	11
13 ,,	16	28	14
12 ,,	10	3	11
11 ,,	6	2	7
10 ,,	1	6	–

The distribution is in every case symmetrical, so that the *mean*, the *mode*, and the *median* are alike 13 inches in each case; but the extent and frequency of deviations from the type is not the same in any two groups. The frequency of deviations from the type in these groups may be compared by Galton's method of quartiles (see below), by the *mean deviation*, or by the *moment coefficients*. The mean deviation is the worst of these measures. It is found by taking all the deviations from the mean which occur (*counting deviations as always positive*), and dividing the sum of the deviations by the whole number of observations. Thus in column *A*, the mean being 13 inches, a deviation of 3 inches occurs *twice*, a deviation of 2 inches occurs *twelve* times, and a deviation of 1 inch *twenty* times. The mean deviation is therefore

$$\frac{(3\times 2)+(2\times 12)+(1\times 20)}{50} = 1 \text{ inch.}$$

Treating the other groups in the same way, it will be found that the mean deviation of *B* and *C* is also = 1 inch. The groups were chosen to illustrate the small value of the mean deviation, for purposes of comparison.

The 1st, 2nd,...*n*th *moment* of a series of observations about its mean is found by taking the 1st, 2nd,...*n*th power of every deviation which occurs, *having regard to sign*, and adding all the quantities so obtained together. The magnitude of the sum obtained depends partly on the range and relative frequency of variations, partly on the number of observations. The *moment coefficient*, found by dividing the moment by the number of observations, depends only on the range and frequency of variation. Moment coefficients are conveniently denoted by the letter μ, with a suffix indicating the moment referred to: thus μ_2 means the 2nd, μ_3 the 3rd moment coefficient, and so on. From the definition of the mean, $\mu_1 = 0$ in all cases; the frequency and extent of deviations from the mean are roughly indicated by the magnitude of μ_2, while the symmetry of their distribution is indicated by μ_3. Thus in the series *A* of sticks,

$$\mu_2 = \frac{(9\times 2)+(4\times 12)+(1\times 20)}{50} = \frac{86}{50}; \text{ in } B, \mu_2 = \frac{130}{50}; \text{ in } C, \mu_3 = \frac{78}{50}.$$

It will be seen that these numbers are a better indication of the differences between the three groups than that given by the 'mean deviation.' In each of these groups, since a positive deviation is always balanced by a negative deviation of equal extent, μ_3 is clearly = 0; and this is the proper test of symmetrical distribution.

As examples of the way in which μ_3 approximates to the value 0 in biological statistics, we may take Baxter's data for human stature, already cited, as an example of nearly symmetrical distribution: in these measurements, $\mu_3 = -1{\cdot}3$; in most observed cases it is much larger.

The direct calculation of moments about the mean becomes very laborious when the mean is not a whole number; for simple indirect methods of doing this, see Pearson, *Philos. Trans.* (1895), A, 345–51, or a summary of Pearson's formulae in Davenport, *Statistical Methods, with Special Reference to Biological Variation*, 1899.

A knowledge of the mean, the mode, and the first three moment coefficients about the mean, give some knowledge of 'typical' character, and of the way in which deviations from it occur: for many purposes, however, as in all questions of heredity, selection, &c., it is necessary to form a complete picture of the relative frequency with which all deviations from the type occur. A mere table of figures cannot be remembered, and few persons can grasp the significance of such a table, even when it is before them. It is easier, therefore, to represent the frequency of variations by means of a geometrical figure. As an example we may take the variations in the number of Müller's glands found by Davenport in the right fore-leg of 2,000 female pigs, observed in Chicago. Among these:

15	pigs	had	0	Müller's	gland	on the r. fore-leg.
209	,,	1	,,	,,	,,	,,
365	,,	2	,,	,,	,,	,,
482	,,	3	,,	,,	,,	,,
414	,,	4	,,	,,	,,	,,
277	,,	5	,,	,,	,,	,,
134	,,	6	,,	,,	,,	,,
72	,,	7	,,	,,	,,	,,
22	,,	8	,,	,,	,,	,,
8	,,	9	,,	,,	,,	,,
2	,,	10	,,	,,	,,	,,

In order to represent these results graphically, we proceed as follows: in a straight line AB (Fig. 1) we choose a fixed point A, and divide the line to the right of A into eleven equal parts, of convenient length, which we number from 0 to 10. Now, whenever we find a pig with no Müllerian glands, we construct a rectangle, of base equal to the length of one division of our scale, and of some convenient height. We place this rectangle with the middle of its base at the point 0 of our scale. If we find a second pig with no Müllerian gland, we erect a similar rectangle on the top of the first. If we find a pig with ten Müllerian glands, we erect a similar rectangle with the middle of its base over the number 10 on our scale, and so on in every case. The result is a series of rectangular columns, such that the *area* of every column represents a certain number of pigs, and the *position* of the column shows the number of Müller's glands possessed by these pigs. The record of pigs with no Müller's gland, and of those with one, is given in Fig. 1, and a record of the whole series, on a smaller scale, by the continuous line in Fig. 2.

The only essential characters of the diagram formed by the continuous line in Fig. 2 are these: its whole area contains as many units of area as there are pigs in the observations recorded; and the horizontal distance of each unit of area from the point A, chosen as origin

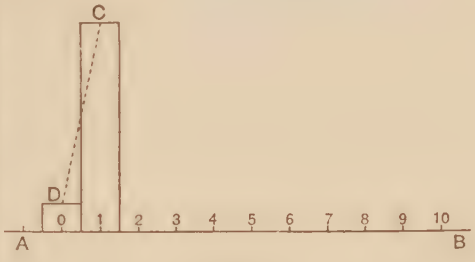


Fig. 1.

Fig. 2.

of measurements, indicates the number of Müllerian glands possessed by the pig which the unit of area records; the rate at which the number of pigs changes in passing from the class with one number of Müller's glands to the class with another number may be estimated by the slope of the line joining the middle of the top of one column to the middle of the top of the next; that is, by the angle between AB and such a line as CD (Fig. 1). Now, by methods described in works on the Integral Calculus, it is possible to construct

a curved figure, such that its moment coefficients about its mean ordinate have fixed values, while the tangent to the curve at any point has a known inclination to the base-line. The curve, whose equation is

$$y = 47{\cdot}24\left(1+\frac{x}{3{\cdot}796}\right)^{3{\cdot}784}\left(1-\frac{x}{14{\cdot}248}\right)^{14{\cdot}201},$$

where x is measured from the *modal* value, has its first four moment coefficients about its mean identical with those of the observations, and its mean is in the same position; further, the tangent to this curve at any point makes an angle with the base-line very nearly equal to that made by a line joining the tops of the two appropriate rectangles. If this curve be divided into vertical strips, along the lines which separate the rectangles of Fig. 2, the area of a strip of the curve will be found to be very nearly equal to that of the corresponding rectangle. The curve is drawn as a dotted line in Fig. 2, but the scale of the diagram is too small to give a fair picture of the agreement between the two.

In terms of such a diagram as this, values of the mean, median, and mode, which cannot occur in actual animals, have a definite meaning. Thus the median number of Müller's glands is given by the abscissa of the ordinate which bisects the area of the curve; the modal number is the abscissa of the maximum ordinate of the curve; the mean number is the abscissa of that ordinate of the curve about which the first moment = 0; and the *quartile deviations* are given by the abscissae of the ordinates which bisect the two halves of the curve on each side of the median ordinate.

The advantage of replacing the system of rectangles, or the table of numbers, by a simple formula which depends upon only a few constants is clear. Such a formula is a means of economizing mental effort, and should be judged only as a means of expressing simply the facts of variation. There is, however, a relation between all those formulae which have hitherto been found to express the facts of organic variation. The characters of individual animals, belonging to any race or species, depend upon a complex series of circumstances, which we cannot know accurately in any given case, although we can learn with a determinable degree of accuracy how often any particular character will occur in a large series of animals. Phenomena of this degree of complexity are the subject-matter of the theory of chance; and for reasons developed in treatises on chance, the formulae expressing the frequency with which all magnitudes of a particular character occur among animals, in all cases which have yet been expressed in a simple way, are expressions for curves, such as that we have just discussed, the areas of successive vertical strips of the curve representing the successive values of the terms of the series

$$\frac{pn(pn-1)(pn-2)\ldots(pn-r+1)}{n(n-1)(n-2)\ldots(n-r+1)}\left\{1+r\cdot\frac{qn}{pn-r+1}+\frac{r\cdot r-1}{1\cdot 2}\cdot\frac{qn(qn-1)}{(pn-r+1)(pn-r+2)}+\frac{r\cdot r-1\cdot r-2}{1\cdot 2\cdot 3}\cdot\frac{qn(qn-1)(qn-2)}{(pn-r+1)(pn-r+2)(pn-r+3)}+\ldots\&c.\right\},$$

where $n>r$, and $p+q=1$.

The well-known binomial expression for certain kinds of chance is clearly a special case of this series; for when $n=\infty$, the series becomes $(p+q)^r$. When $p=q$, the terms of $(p+q)^r$ are given by the areas of successive strips of the simple symmetrical curve, so much used by physicists and others in tabulating errors of observation, whose equation is

$$y=\frac{1}{c\cdot\sqrt{\pi}}\,e^{-\frac{x^2}{c^2}},$$

where $c=\sqrt{2\,pqr}$.

The more complicated expressions for cases in which p and q are not equal were first formulated by Karl Pearson (loc. cit.).

The theory of chance was first seriously applied to the formulation of human characters by Quetelet. Later, Francis Galton greatly extended Quetelet's work, and applied the theory of CORRELATION (q.v.) to the study of HEREDITY (q.v.). The treatment of inheritance, introduced by Galton, gave the first possibility of numerically estimating one of the most important factors in any theory of evolution: his work dealt at first only with those cases which could be formulated by the simple symmetrical 'law of error' just referred to. The more general expressions given by Pearson (*Philos. Trans.*, 1895, 1896, 1897; *Proc.Roy.Soc.*, 1898, and elsewhere) have made it possible to apply Galton's methods more generally, and to formulate in a fairly simple way a large number of facts concerning variation.

The formulae expressing the correlation between two or more organs in one body, or between an individual and two or more ancestors, cannot be discussed here. For these the reader should consult Galton's *Natural Inheritance*, in which the foundation of the

whole method is laid down, and Pearson's *Grammar of Science* (2nd ed., 1900), which contains an admirable account, in very simple form, of all numerical problems connected with the theory of evolution.

Literature: besides the indications given, see VARIATION (in biology). (W.F.R.W.)

Variational Psychology: Ger. *Variationspsychologie*; Fr. *psychologie variationnelle, psychologie des variations*; Ital. *psicologia variazionale*. That department of PSYCHOLOGY (q. v.) which treats of mental variations.

It is recommended that this term be used to cover the smaller fields of INDIVIDUAL and FOLK PSYCHOLOGY (see those terms), in which variations are respectively individual and racial or tribal, and also that of specific or typical differences. See TYPE (mental).

Among the greater general problems are (1) the correlation of variations, as illustrated in the work in CRIMINAL (q. v.) psychology and anthropology and the investigations of the GENIUS (q. v.); (2) the statistical treatment of mental variations in close connection with the corresponding work in biology and sociology; (3) investigation of the origin of mental variations and modifications through heredity, education, social environment, &c.; (4) the extent, origin, and tests of mental types. These classes of problems justify the use of a broader name; they have had little treatment, but considering the objective and quantitative methods which may be applied to variations, they offer, as do the analogous problems in biology, most important results. See VARIATION (different topics). (J.M.B., G.F.S.)

Variety (in biology) [Lat. *varietas*, difference]: Ger. *Varietät*; Fr. *variété*; Ital. *varietà*. A variety or race is a subdivision of a species, marked by certain recognizable characteristics, which are constant, so that the variety is more or less permanent. When the variety occurs in certain localities, and not in the whole territory inhabited by its species, it is called a 'geographical variety.'

Literature: CH. DARWIN, Origin of Species; and Animals and Plants under Domestication; DAVENPORT, Statistical Methods in Biology (1900); the literature of SPECIES (in biology). (C.S.M.)

Variety in Unity: see UNITY OF VARIETY.

Varro, Marcus Terentius. Lived between 115 and 25 B.C. The learned friend of Cicero, and representative of philosophical eclecticism with Stoicism especially prominent. He wrote forty-one books called 'Antiquitates.'

Vaso-constrictor: see VASO-MOTOR NERVES.

Vaso-dilator: see VASO-MOTOR NERVES.

Vaso-motor Centre: Ger. *Gefässcentrum, vasomotorisches Centrum*; Fr. *centre vasomoteur*; Ital. *centro vasomotore* (or *vasomotorio*). An ill-defined region of the medulla oblongata, laterally of the fourth ventricle, which is concerned in maintaining the arterial tone of the body.

It seems not to be concerned with vaso-dilator impulses, and must not be regarded as exclusively responsible for vaso-constrictor impulses, for this function is in part performed by the spinal cord at large. It is rather an initiatory and co-ordinating centre for all vaso-motor processes. Cf. VASO-MOTOR NERVES. (H.H.)

Vaso-motor Nerves: Ger. *Gefässnerven, vasomotorische Nerven*; Fr. *nerfs vasomoteurs*; Ital. *nervi vasomotori*. Nerves which are concerned with the regulation of the calibre of the arteries, by innervating the muscular coats of the blood-vessels, and hence with the distribution of the blood. (H.H.–C.F.H.)

We distinguish two kinds, vaso-dilator and vaso-constrictor fibres. The latter send impulses to the muscular coats of the arteries (especially the minute vessels) and normally keep them in a state of tonic contraction. They originate in the lateral cornu of the spinal cord, and pass out through the ventral roots to the sympathic ganglia, from which they distribute to the arteries *via* the sympathic nerves or along recurrent branches to the spinal nerves. See NERVOUS SYSTEM (sympathetic). Stimulation of these fibres produces pallor; their inhibition produces flushing. These vaso-constrictor impulses are more or less under the control of the VASO-MOTOR CENTRE (q. v.) of the medulla.

The vaso-dilator fibres are not so thoroughly integrated into a single system as the vaso-constrictor, nor do they have so important a part to play in controlling the circulation. They arise in various parts of the central nervous system and are distributed by way of the ventral roots.

Closely related to the general vaso-motor system are the nerves regulating the rate and strength of the heart-beat. Three classes here deserve mention.

The inhibitory nerves of the heart arise in the medulla, pass out through the vagal portion of the spinal accessory nerve, and then into the vagus. Their action is to suppress the action of the heart. They resemble the

vaso-constrictor nerves of the general vaso-motor system.

The accelerator or augmentor nerves to the heart arise in the spinal cord and pass out to the sympathic ganglia and thence to the heart. They seem to correspond to the general vaso-dilator system.

The depressor nerves diminish blood-pressure by reflex action on the vaso-motor centres. More specifically, an afferent nerve passing from the heart to the vaso-motor centre of the medulla *via* the vagus. Its function is to inhibit the vaso-constrictor nerves of the body, thus lowering the blood-pressure and relieving the heart. (H.H.)

Vaso-motor System: Ger. *Gefässsystem*; Fr. *système vasomoteur*; Ital. *sistema vaso-motore.* The entire vaso-motor system consists of the following parts (cf. the preceding topics):

(1) Chief vaso-constrictor centres (and probably vaso-dilator centres) situated in the medulla, about the level of the seventh nerve (rabbit).

(2) Medullated nerve-fibres passing from this centre out *via* motor roots of nerves (white *rami communicantes*) to the ganglia of sympathetic system.

(3) Similar subordinate centres in the spinal cord.

(4) Vaso-motor nerves proper, which arise as neurites of sympathetic cells and pass as non-medullated fibres to be distributed to the blood-vessels.

It has thus far been impossible to demonstrate (physiologically) vaso-motor nerves in the brain or spinal cord.

Vaso-constrictor nerves were first discovered by Claude Bernard (1851) and Brown-Séquard (1852). Vaso-dilator nerves were first demonstrated (1855) by Schiff; and the whole subject relating to influence of nervous system over the circulation was most thoroughly studied by Ludwig. (C.F.H.)

Vedânta Philosophy: see ORIENTAL PHILOSOPHY (India).

Vedic Religion [Sansk. *veda*, knowledge]: Ger. *Religion der Vedas*; Fr. *religion védique*; Ital. *religione vedica.* The ancient religion of the Hindus, of which Brahmanism was the matured form, consisting in the worship of deities who were personifications of the forces or aspects of nature.

Literature: see BRAHMANISM, and ORIENTAL PHILOSOPHY (India). (A.T.O.)

Vegetable: see PLANT; and cf ANIMAL.

Velleity [Lat. *velle*, to be willing]: Ger. *Velleität*; Fr. *velléité*; Ital. *velleità.* The conative aspect of a mental process or content. See CONATION.

A term not in general use. (J.M.B., G.F.S.)

Velocity [Lat. *velocitas*, from *velox*, swift]: Ger. *Schnelligkeit*; Fr. *vitesse, vélocité*; Ital. *velocità.* Rate of movement of a body in space.

For the unit of measurement of velocity, and the unit of acceleration of velocity, see UNIT (of physical measurement, velocity). (J.M.B.)

Vengeance: Ger. *Rache*; Fr. *vengeance*; Ital. *vendetta.* The act or other circumstances in which REVENGE (q. v.) issues.

One may feel revenge but stop short of vengeance, which always terminates, or is intended to terminate, on the appropriate object. (J.M.B.)

Ventricle [Lat. *ventriculus*]: Ger. *Ventrikel, Hohlraum*; Fr. *ventricule*; Ital. *ventricolo.* One of the cavities or coelia within the brain derived from persistent portions of the original embryonic medullary cavity. Cf. the figures given under BRAIN.

In combination coele is preferable, as in diacoele (= third ventricle). There are the two paracoeles (lateral ventricles), the diacoele (third ventricle), the mesocoele (in mammals, &c., forming the aqueduct of Sylvius, or iter), the metacoele (fourth ventricle). The so-called pseudocoele (fifth ventricle) is not a true ventricle, but a cleft left by the partial concrescence of the two plates of the lamina terminalis.

In comparing the nervous elements of the brain with those of a peripheral sensory epithelium it is necessary to remember that the ventricular cavity, and hence the endymal surface, is morphologically an invaginated part of the original external epithelium. The apparent outer surface of the brain is thus morphologically internal and the ventricular aspect is external. (H.H.)

Ventriloquism [Lat. *venter*, belly, + *loqui*, to speak]: Ger. *Bauchreden*; Fr. *ventriloquie*; Ital. *ventriloquio.* The production of sounds, mainly by a modification of the respiration, by which the voice appears to come not from the person speaking, but from a distance, or from an opposite direction.

It is of interest as an illusion of the direction and quality of sound, and has probably been important in the history of magic, and the pronouncements of oracles. An assumed form of speech of similar character occurs as an occasional symptom in delusional insanity,

and seems connected with systematized delusions. (J.J.)

Veracity [Lat. *verax*, truthful]: Ger. *Wahrhaftigkeit*; Fr. *véracité*; Ital. *veracità*. The disposition not to deceive another by positive misrepresentation; that is, not to Lie (q. v.).

The appreciation of veracity, especially as regards speech, has varied much in ancient and modern ethics. The Greeks did not include it in the cardinal virtues, or regard it as absolutely and invariably obligatory. Plato gives expression to their estimate of it in the *Republic* (ii. 382), where he distinguishes between the 'true lie' or the 'lie in the soul,' which is hated by both gods and men, and the 'lie in words,' which is, in certain cases, useful and not hurtful, as in dealing with enemies or with friends in a fit of madness or illusion, and in mythology, where we do not know the truth. He also justifies the 'noble' or 'royal lie' (γενναῖον ψεῦδος): the rulers are privileged to lie for the public good (iii. 389, 414). The modern juridical conception of morality as obedience to law has led to a more rigorous enforcement of the duty of veracity. Kant, e. g. in his *Über ein vermeintes Recht, aus Menschenliebe zu lügen* (Abbott's trans., 361–5), maintains the absolute obligatoriness of veracity, since lying, if universalized, contradicts the presuppositions of human intercourse. 'To be truthful in all declarations is therefore a sacred unconditional command of reason, and not to be limited by any expediency.' A single exception would destroy that universality which is essential to a moral principle. On the Jesuitical depreciation of the virtue on the ground that the end justifies the means, see Equivocation. Cf. also Casuistry. (J.S.)

The principles involved in the discussion, besides the psychological and logical ones indicated by the word positive in the definition (explained under Lie) and in the article Equivocation, would seem to be, or at least to involve, the following: (1) the fact of ethical conflict, the possible dilemma of choosing the lesser of two violations of nominal duties, one of which is unavoidable. This raises the whole question of the relativity of ethical formulations. (2) The possible distinction between duties as social or not, the former springing from social relationships, and in so far getting their entire sanction from social utilities. This distinction would possibly open a door for a 'certain discrimination of higher and lower,' even to those who hold that there are absolute ethical principles. (J.M.B.)

Verbal (in logic) [Lat. *verbum*, a word]: Ger. *verbal*; Fr. *verbal*; Ital. *verbale*. Turning upon the use or meaning of words, as 'verbal argument.'

Applied mainly to arguments, definitions, &c., which involve distinctions of words merely, and are with reference to fact or truth fallacious or meaningless. (J.M.B.)

Veridical Hallucinations: see Telepathy, passim.

Verification [Lat. *verus*, true, + *facere*, to make]: Ger. *Bewährung, Bestätigung*; Fr. *vérification*; Ital. *verificazione*. It is desirable to understand by a verifiable hypothesis one which presents an abundance of necessary consequences open to experimental tests, and which involves no more than is necessary to furnish a source of those consequences. The verification will not consist in searching the facts in order to find features that accord or disagree with the hypothesis. That is to no purpose whatsoever. The verification, on the contrary, must consist in basing upon the hypothesis predictions as to the results of experiments, especially those of such predictions as appear to be otherwise least likely to be true, and in instituting experiments in order to ascertain whether they will be true or not.

These experiments need not be experiments in the narrow and technical sense, involving considerable preparation. That preparation may be as simple as it may. The essential thing is that it shall not be known beforehand, otherwise than through conviction of the truth of the hypothesis, how these experiments will turn out. It does not need any long series of experiments, so long as every feature of the hypothesis is covered, to render it worthy of positive scientific credence. What is of much greater importance is that the experiments should be independent, that is, such that from the results of some, the result of no other should be capable of reasonable surmise, except through the hypothesis. But throughout the process of verification the exigencies of the economy of research should be carefully studied from the point of view of its abstract theory.

When, in 1839, Auguste Comte laid down the rule that no hypothesis ought to be entertained which was not capable of verification, it was far from receiving general acceptance. But this was chiefly because Comte did not make it clear, nor did he apparently understand, what verification consisted in. He seemed to think, and it was generally under-

stood, that what was meant was that the hypothesis should contain no facts of a kind not open to direct observation. That position would leave the memory of the past as something not so much as to be entertained as plausible. (C.S.P.)

Vertebrate [Lat. *vertebra*, a joint]: Ger. *Wirbelthier*; Fr. *vertébré*; Ital. *vertebrato*. Strictly, an animal having vertebrae, but used to designate all members of the sub-kingdom to which animals with vertebrae belong. Cf. INVERTEBRATE.

The lowest fishes (myxinoids and amphioxus, a fish-like animal) present no trace of vertebrae, the axial skeleton comprising only the notochord. (C.S.M.)

The Vertebrata, sometimes called Chordata, all possess a dorsal skeletal notochord at some time in their development.

Literature: GEGENBAUR, Compar. Anat.; WIEDERSHEIM, Vergleichende Anat.; PARKER and HASWELL, Zoology; C. CLAUS, Textbook of Zoology (Eng. trans., 1890). (C.S.M.–E.S.G.)

Vertex [Lat., from *vertere*, to turn]: Ger. *Scheitel*; Fr. *sommet, vertex*; Ital. *vertice, bregma*. The top or crowning point of the head; the highest point of the human skull when the body is in a perfectly erect position.

It is usually just behind the bregma (*Bg*, in figure given under CRANIOLOGY, q.v.). (J.J.)

Vertigo [Lat. *vertigo*, a turning]: Ger. *Schwindel*; Fr. *vertige*; Ital. *vertigine*. Dizziness, with fear of falling, a confused sensation as of swimming of the head, and apparent motion of outward objects.

Vertigo as a sensation may vary in degree from a slight sense of confusion or instability up to violent reeling and actual falling in an attempt to correct the subjective sensations of apparent motion of surrounding objects. The mechanism, the disturbance of which produces vertigo, is a very complicated one. The special organs of EQUILIBRIUM (q.v.) are concerned, probably, the semicircular canals, and the brain centre for such co-ordinations of equilibrium, situated in the cerebellum. The sensations obtained from this source are co-ordinated with visual inferences of position and movement. Vertigo may be produced in most persons by unusual or violent locomotion, as oscillation in a swing, turning rapidly around on one's heels, ascent or descent in an elevator, the irregular movements of a ship, balloon, or train. Vertigo as the result of drug action is marked in the case of alcohol.

As a symptom of disease, vertigo is of various significance. It has been associated with pressure upon the brain, concussion or injury of the brain (as by tumours, disturbances of circulation, blows, &c.), particularly in diseases of the cerebellum; with anaemia of the brain from general anaemia or arterosclerosis; its frequency in multiple sclerosis has been noted; it is often a characteristic factor in the epileptic seizure, and in some cases takes the place of such a seizure; it is particularly significant in aural, especially labyrinthine, difficulties, in one form of which (Ménière's disease) the vertigo forms the chief symptom; it is frequent in neurasthenia and related conditions; and it is connected with ocular as well as visceral disturbances.

Ocular vertigo is an unusual disorder, due generally to weakness or paralysis of an ocular muscle, and a consequent false orientation of the body with reference to seen objects. The ocular sensation (as of moving objects) is an important one in all forms of vertigo. Aural vertigo arises from disease in the internal ear, and includes Ménière's disease as one of its severer forms. This disorder, which is often preceded by earache, slight deafness, ringing in the ears, is of a paroxysmal nature. The patient is more or less suddenly seized with intense vertigo, may reel about or fall to the ground; objects seem to move about, and even slight loss of consciousness may occur. Some patients feel impelled to go through circular or backward movements, others are hurled to the ground as by an unseen force. In repeated attacks the same forms of movement are experienced, indicating in some cases a local affection of one canal or group of canals. In most cases there is a succeeding dazed period, often accompanied by pallor, vomiting, and severe physical depression.

The vertigo that is characteristic of neurasthenia is largely of a subjective character, a feeling of swimming and confusion, rarely amounting to reeling or the apparent moving of outward objects. It is generally relieved by assuming a horizontal position, and is associated with states of fatigue. Vertigo of gastric origin is probably not a frequent disorder, although an attack of indigestion, seasickness, and the like, is the occasion or predisposition to vertigo in those liable to these disorders.

Literature: GOWER, Diseases of the Nerv. Syst.; HITZIG, Der Schwindel, in Nothnagel's Spez. Ther., xvii. 2 (2nd ed., 1898). (J.J.)

Vested Rights: see RIGHTS.

Vestige [Lat. *vestigium*, a footprint]; Ger. *Spur*; Fr. *vestige*; Ital. *vestigio*. See VESTIGIAL ORGANS AND CHARACTERS.

Vestigial Organs and Characters. Reduced and often useless organs or characters which, on the theory of evolution, represent the fully functional and useful organs or characters of ancestral animals: a single such organ or character is called a vestige.

(C.LL.M.—J.M.B.)

This phrase has largely replaced the earlier phrases rudimentary organs and rudiment. It thus distinguishes organs in process of DEGENERATION (q. v., in biology) from organs in process of evolution (cf. RUDIMENT). Darwin discussed the value of such organs as evidence of the transmutation of species. Cf. also ATROPHY.

Since the theory of evolution has become widely accepted, the method of suppression has been discussed. On the Lamarckian hypothesis disuse is itself sufficient to effect reduction of size and complexity, since the effects of disuse are on this hypothesis inherited. Those who reject this hypothesis account for the facts by reversed selection, assuming that the possession of the organ constitutes a disadvantage, by cessation of selection with PANMIXIA (q. v.), and by the principle of economy of growth with INTRASELECTION (q. v.). Weismann has added the hypothesis of GERMINAL SELECTION (q. v.) or a competition for nutriment in the waxing and waning determinants or structural units in the germinal substance, by which the stronger increase while the weaker diminish.

Literature: C. DARWIN, Origin of Species; J. G. ROMANES, Darwin and after Darwin, ii; WEISMANN, The Germ-Plasm; and Germinal Selection. (C.LL.M.)

Veto: see FIAT, and NOLITION.

Vibration [Lat. *vibrare*, to shake]: Ger. *Vibration*; Fr. *vibration*; Ital. *vibrazione*. The rapid rhythmical movement of a body or parts of a body back and forth in a linear path or closed curve. In the latter case the vibration is called circular, elliptic, &c., according to the form of the path.

Movement in one direction is sometimes called a single, and that in both directions a complete vibration. Such a vibratory movement when propagated through a homogeneous medium is called an undulation or wave. Cf. ETHER. (S.N.)

Vicarious Atonement [Lat. *vicarius*, taking another's place]: Ger. *stellvertretendes Sühnopfer*; Fr. *expiation vicariale*; Ital. *espiazione vicaria*. That theory of the Atonement which represents it as a substitutionary sacrifice for sin on the part of the Redeemer, by virtue of which the sinner's debt to the divine law is satisfied and the merit of Christ's obedience is imputed to him as the ground of his justification.

The vicarious theory is opposed to the moral theory and presupposes the necessity of expiation. It rests on the notion of substitution, and is the work which was accomplished by Christ in the stead of the sinner.

Literature: see ATONEMENT. (A.T.O.)

Vice [Lat. *vitium*]: Ger. *Laster*; Fr. *vice*; Ital. *vizio*. Gross, and more or less habitual, departure from VIRTUE (q. v.).

Like virtue, vice extends to character, disposition, and habit of life. It is contrasted in degree with moral defect and FAULT (q. v.). See also SIN. (J.M.B.)

Vico, Giovanni Battista. (1668–1744.) Born at Naples, and educated by the Jesuits. Private tutor for several years in the house of the bishop of Ischia; professor of rhetoric in Naples, 1697; royal historiographer, 1735. 'The bold and profound creator of the philosophy of history' (Falckenberg). See Cantoni, *G. B. Vico*.

Victorinus, Marius: see SCHOLASTICISM, I.

Virtual [Lat. *virtus*, strength, from *vir*, a man]: Ger. *virtuell*; Fr. (1) *virtuel*; Ital. (1) *virtuale*. (1) A virtual X (where X is a common noun) is something, not an X, which has the efficiency (*virtus*) of an X.

This is the proper meaning of the word; but (2) it has been seriously confounded with 'potential,' which is almost its contrary. For the potential X is of the nature of X, but is without actual efficiency. A virtual velocity is something *not* a velocity, but a displacement; but equivalent to a velocity in the formula, 'what is gained in velocity is lost in power.'

So *virtual representation* was the non-representation of the American colonies in the British Parliament, which was supposed to be replaced by something. So Milton asks whether the angels have *virtual* or immediate touch. So, too, the sun was said to be *virtualiter* on earth, that is, in its efficiency.

(3) *Virtual* is sometimes used to mean pertaining to virtue in the sense of an ethical habit.

Virtual knowledge: a term of Scotus defined by him (*Opus Oxon.*, Pt. I. iii. 3) as follows: 'Quantum ad notitiam habitualem sive virtu-

alem, primo expono quid intelligo per terminos. *Habitualem* notitiam voco, quando obiectum sic est praesens intellectui [i.e. to the thought] in ratione intelligibilis actu ut intellectus statim possit habere actum elicitum circa illud obiectum. Voco *virtualem*, quando aliquid intelligitur in aliquo, ut pars intellecti primi, non autem ut primum intellectum sive ut totale terminans intellectionem; sicut cum intelligitur homo intelligitur animal in nomine, ut pars intellecti, non ut intellectum primum, sive totale terminans intellectionem. Hoc satis proprie vocatur intellectum *virtualiter*, quia est satis proximum intellecto in actu. Non enim posset esse actualius intellectum, nisi esset propria intellectione intellectum, quae esse ipsius primi, ut termini totalis.'

Virtual difference: a term of the doctrine of *formalitates* set forth by Scotus, *Opus Oxon.*, Pt. I. ii. 7. (C.S.P.)

Virtue [Lat. *virtus*, manliness, equivalent to Gr. *ἀρετή*, excellence]: Ger. *Tugend*; Fr. *vertu*; Ital. *virtù*. Excellence of character, disposition, and habit of life, with reference to generally accepted moral standards. (J.S.–J.M.B.)

The nature of virtue and the classification of the virtues engaged the attention of both the ancient and the mediaeval moralists. Socrates made the moving spring of virtue adequate knowledge of the good, that of vice ignorance of it; and from this view of the nature of virtue he deduced the unity of the virtues, which were simply the different applications of the knowledge of the good. Plato distinguished four cardinal virtues, wisdom (*σοφία*), courage (*ἀνδρεία*), temperance (*σωφροσύνη*), and righteousness (*δικαιοσύνη*). Aristotle, investigating more carefully the psychological nature of virtue, defined it as a habit (*ἕξις*), as distinguished from a mere activity (*ἐνέργεια*). This habit implies deliberate choice or preference, and is in accordance with right reason. Its object or content is the mean (*μεσότης*) between the two extremes of excess and defect. The application of this doctrine to the details of the moral life gives Aristotle his list of virtues, which includes, besides courage and temperance, liberality, munificence, high-mindedness, gentleness, agreeableness, truthfulness, wittiness, and modesty. In addition to these virtues of the individual life, Aristotle recognizes justice and friendship, as the virtues called for by the social relations in which the individual stands to the state and to other individuals. So far, however, account has been taken only of moral or practical virtue, which consists in an established or habitual control of irrational impulse by reason. Intellectual virtue is the excellent or rational exercise of the rational soul itself. The chief intellectual virtues are speculative wisdom (*σοφία*), which deals with the absolute nature of things, and prudence or practical wisdom (*φρόνησις*), which deals with the relative and changing conditions of human conduct. Aristotle insists upon the intellectual nature of moral virtue, since the latter, in all its forms, presupposes rational insight (*φρόνησις*).

The mediaeval moralists followed Aristotle in his division of virtues into intellectual and moral. To the cardinal virtues of Plato they added the 'theological' virtues. The former they regarded as 'natural,' or 'acquired by human acts'; the latter as 'supernatural,' or 'infused by God.' The cardinal virtues lead only to natural or human happiness; the theological lead to supernatural or divine happiness. 'Habituation,' says Thomas Aquinas, 'contributes to both, but in different ways. It causes acquired virtue; it disposes to infused virtue; and where infused virtue exists, it preserves it and advances it' (*Summa Theol.*, i–ii. q. 92, art. 1, § 1; cf. i–ii. q. 65, art. 2; i–ii. q. 62). The theological virtues are faith, hope, and charity. Faith has special reference to the intellect, hope and charity to the will. The Christian Church further added to the classical list of virtues such additional phases of character as patience and humility.

The question of the fundamental nature and value of virtue was investigated by the Stoics and Epicureans, the former regarding it as an end-in-itself, the latter as the most important means to happiness. The early British moralists were also more concerned with this problem than with that of the good, raising the further questions of the 'sanctions' of virtue, and of its egoistic or altruistic content. Butler's contribution to this discussion is most important. In his view virtue is a following of human nature as a systematic whole, or acting in accordance with the guidance of the higher (rational or reflective) principles → conscience, self-love, and benevolence. Its obligation is intrinsic: man, as a rational being, is a law unto himself.

Literature: that of ETHICS; see also BIBLIOG. F, 2, *e*. (J.S.)

Virtue (in theology): Ger. *Kräfte* (plural), *Tugend*; Fr. *vertu*; Ital. *virtù*. Those elements of character are virtues which are distinctive of the Christian ideal, as faith, hope, love, submission to the divine will, &c., and which

presuppose, subjectively, the regenerate nature, and objectively, a kingdom of grace in which they are supreme ends.

In mediaeval thought a distinction was made between natural and theological or supernatural virtue, the latter being regarded as a function of divine grace. The Reformation resulted in the abolition of this distinction, and two lines of ethical thinking originated: (1) philosophical ethics, a development of morality on an extra-dogmatic basis; (2) Christian ethics, which sought to develop the science of duty or virtue as a branch of Christian dogmatics. Christian ethics aims at a reconstruction of the whole scheme of duty on a basis of divine grace. All virtues, according to it, are functions of the regenerate nature. See ETHICS (Christian, also for literature). (A.T.O.)

Vision[1] [Lat. *videre*, to see]: Ger. *Gesicht*, *Sehen*; Fr. *vision*, *vue*; Ital. *visione*. The sense whose organ is the eye, whose stimulus is light, and whose nerve is the *opticus*. (J.M.B.)

I. *General.* In the production of visual sensation, several distinct processes in the human organism are involved. In the retina the ether vibrations (which we know to be still ether vibrations when they reach this surface) are transformed into some other form of energy which can be conveyed along the nerves—we know not what form, but at least it must be something very different from light, because vibrations of that degree of rapidity would cause the destruction of delicate nervous tissues. In the occipital lobes of the cortex there takes place, under the influence of this conveyed excitation, some process which is the immediate condition of the visual sensation. Before reaching the cortex, the optic fibres pass through intermediate ganglionic stations (quadrigeminal bodies, optic thalamus), but it is not known that these have any essential part to play in the sensation that enters consciousness—they may have no other function than to effect reflexly the motions of pupil, ciliary muscle (accommodation), convergence, &c., which are essential to effective vision (Fig. 1). When the cortical centres have been destroyed, no visual sensation is possible, but the same thing is not true concerning the retina: the basal ganglia and the retina may both be thrown out of action by disease, and sensation may nevertheless persist; as a preceding symptom of MIGRAINE (q. v.), which seems to be due to a spasm in the cerebral, or more rarely the retinal, circulation, and of epilepsy, there are very commonly experienced subjective visual sensations, which are sometimes in the form of rings and balls, like the pressure-phosphenes, or zigzags in incompleted curves (fortification-figures, scintillating scotomata), but which sometimes have the appearance of natural objects or of human figures. These frequently enter the field of vision at one side, and the patient instinctively turns the head and the eyes to follow them:

Fig. 1. Hypothetical scheme for the optical conducting paths. *OO*, cortical centre; *MM*, mid-brain; *Ch*, chiasm; *RR*, retinal terminations; ↑, centripetal paths; ↓, centrifugal paths; →, lateral connecting paths.

this shows that the cortical process carries with it what is essential to spatial localization without the participation of the retina. But it also shows, as was plainly affirmed by Gowers before the recent work of Flechsig on the subject, that there are secondary cortical centres (association centres, or, as they may perhaps be designated, perception centres) where the immediate data of visual sensation are worked up into more complicated forms. As still more conclusive proof of the possible cortical origin of visual sensation may be mentioned a remarkable case in which a man stricken blind in both eyes saw a sudden flash of fire just before the on-coming of unconsciousness, and in which dissection showed

[1] In this article, points that are of special interest to the psychologist will be discussed at some length. For the ordinary details in regard to the working of the eye as an optical instrument, see the textbooks of physiology, as Bowditch in Howell's *Amer. Textbook of Physiol.* (2nd ed., 1900).

degeneration of the optical cortex, with everything below the cortex in a perfectly healthy condition (*Subj. Lichtempf. bei totalem Verluste des Sehvermögens, m. Zerstörung d. Rinde beider Hinterhauptslappen*, Diss., Marburg, 1895, P. Schirmer). This proves to perfection that chemical changes in the cortex, although not brought about by excitation coming in from below, suffice to affect consciousness (and with spatial attribute as well as simple sensation quality). On the other hand, there are cases on record of most disturbing visual sensations (rings and balls of colour) due to irritation of the cortex caused by a diseased retina which was entirely blind to light—as was proved by the fact that these disturbances ceased when the eye in question was enucleated. (It is therefore impossible to say that what is usually called IDIO-RETINAL LIGHT (q. v.), or the self-light of the retina, is or is not in reality cerebral light; most probably it is of both cerebral and retinal origin, since it is beyond question that internal irritations from either source do, upon occasion, enter consciousness.)

There are, then, aside from the conducting fibres, four separate stations, in general, in the affection of consciousness by external light—the retina, which is, indeed, not only a neuro-epithelial surface, but also a true nervous centre shifted to the periphery (cephalopods, which have, taken together, all the different nervous layers of the human eye, have some of them in the brain and not in the retina)[1]; the basal ganglia; the primary visual centres in the occipital lobe; and the final association-centres. Each of these may apparently be excited to its characteristic activity by internal sources of activity, in the absence of incoming stimulation from below.

In the lower animals the visual process is certainly of much less complexity than in the human visual organ; all that is essential to such a process is that there should be some form of reaction to the transverse vibrations of the ether. Any animal in which a portion of the ectoderm is so differentiated as to be a receptive organ for this form of excitation may be said to possess an eye, whether the reaction to the excitation is conscious or unconscious; in certain of the lower forms of animal life the whole surface of the body is obscurely sensitive to light. Sensations of colour (as well as of form), as they exist in the perfected eye, are modalities of the fundamental luminous sensations, which are without question of rather recent phylogenetic development. Wherever there is an eye with two distinct forms of visual elements, rods and cones, it is probable that there is a sense of colour. Below that, there is no evidence of this aspect of the luminous sensation: many observers have declared that the lower animals have a colour sense, and that they have strong colour-preferences (Graber); but this conclusion is not warranted, for a preference for one region of the spectrum over another may perfectly well be a preference for a particular degree of brightness. Since we have found out that the relative brightness of the different spectral regions is, for ourselves, totally different according as the illumination is faint or bright (the PURKINJE PHENOMENON, q. v.), there is no reason to infer that animals have any sense for actual colour from the fact that they go from one coloured apartment into another, even though these have been made equally bright for the normal human eye. It has lately been found, in fact, that even bees are attracted by odours rather than by any sense for colour: flowers when covered by paper are visited by them just as frequently as if they were exposed to view.

The eye is considered to be the most highly developed of the sense organs, not only because of its comparative perfection as an optical apparatus (the lens is a piece of living matter which approaches the regularity of a solid with mechanically perfected curved surfaces), but also because of the number of different forms in which it effects sensible discrimination. The pressure sense, the heat sense, the cold sense are senses with good local discrimination, but with variation within a single terminal organ for intensity only, without discrimination of quality—we cannot tell whether a given amount of heat comes to us from the infra-red or the red or the yellow rays of the spectrum. In the ear we have discrimination for different objective vibration-rates (the sound-waves) in the form of the different subjective quality attached to notes of different pitch, and to this discrimination is given up the physiological space-discrimination in the auditory organ—namely, the succession of fibres of the basilar membrane; there is left no means of acute local discrimination, and, in fact, in the auditory sense we have no space-discrimination other than by the greater loudness of a sound heard by one ear than by the other, or by a rough difference in quality

[1] The optic nerve is not a nerve, properly speaking, but a portion of cerebral white matter pushed forward (Greef, *Arch. f. Ophthal.*, xxix. 85, 1900).

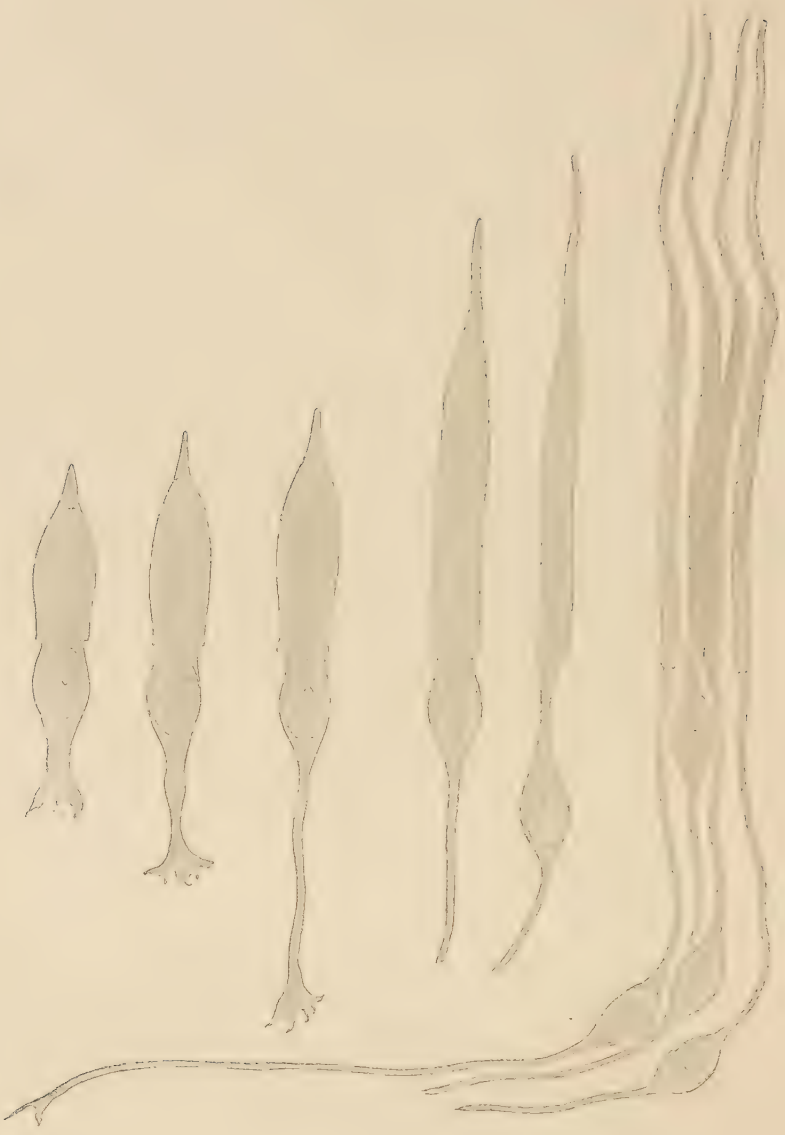


Fig. 2. Cones from the different retinal zones (Greef). I, close to the ora serrata; II, 3 mm. from the ora serrata; III, halfway between the ora serrata and the papilla; IV, periphery of the macula lutea; V, macula lutea; VI, fovea centralis.

Dict. Philos., vol. ii, p. 767.]

according as one or another element of a tone is reinforced by the reflecting walls of the meatus auditorius (Angell, *Psychol. Rev.*, 1901).

In the eye we have a far more keen and dominating sense for space than in any other sense organ—so much so that the quality which stands pre-eminently in consciousness for space itself is the retinal spatial quality. In this organ, the distribution of rods and cones within the sense organ is the primary physiological intermediary between physical and subjective space; consequently there is left no very exact means for quality-discrimination within the sense, and, in fact, our subjective reactions to differences of vibration-period in light-waves are very inadequate. The whole gamut of light-waves is responded to by us subjectively with only four different sensation qualities—red, yellow, green, and blue. These are the sensations which are produced in their purity by, about, the wave-lengths 576 $\mu\mu$, 505 $\mu\mu$, 470 $\mu\mu$, and a colour a little less yellow than the red end of the spectrum. For all intermediate wave-lengths we have nothing in sensation except combinations of these hues, or *colour-blends*, as reddish-yellow, blue-green, greenish-yellow, &c., but with this very singular peculiarity, that non-adjacent colour-pairs do *not* give colour-blends (red and green reproduce yellow, and blue and yellow give white, or grey); were it not for this latter circumstance, the confusion in the response to ether-radiation distinctions would be far greater than it is now. Hence we have no means of determining whether the sensation which we get from wave-length 486 $\mu\mu$, say, is due to light of that wave-length as an objective cause or to a physical mixture of light of wave-lengths 492 $\mu\mu$ and 470 $\mu\mu$; in other words, our visual organ, as a means of giving us knowledge regarding the radiations reflected from or emitted by objects, is exceedingly inadequate. It follows from this that we can never have, in the play of colours, intricate aesthetic combinations and involutions corresponding to musical compositions in tones. The sensation elements are far too simple for that; they are like what we should get from a primitive musical instrument with only four strings.

Provision for vibration-period quality being so inadequate as this, and spatial distribution upon the retina being correlated with the highly developed spatial consciousness of the visual sense, what is the physiological mechanism by which four distinct sources of colour-sense are communicated from retina to brain? Scattered sparsely among the rods (the primitive organ for a non-differentiated luminous sensation) are the cones, which alone, it is probable, provide for the sensation of colour; is a single cone the seat of all four colour-processes, and are all four sets of excitation conveyed from one cone along one optic nerve-fibre to the brain? The physiologists are strongly of the opinion at present that all nerve-fibres convey one and the same sort of excitation, and that conscious distinctions of quality are brought about by different reactions in the cortical cells in which they debouch. But, (1) they have chiefly in mind the simpler structures, where there is nothing against such a supposition (muscle, pressure, auditory sensations)—it is *only* in the sense for colour that occasion arises for making a different assumption, and hence analogy from other cases is entirely without force; (2) it has been too much the custom to think of a nerve-fibre as if it were a simple structure: the recent work of Apáthy has fastened attention upon the fact, apparently forgotten by the physiological theorists, that each nerve-fibre is composed of a number of fibrillae; hence there is nothing against the doctrine of specific energy, if that be applied to fibrillae instead of to fibres, in supposing that a single cone is a laboratory for, and a single fibre a conductor for, several different sorts of excitation; (3) the only anatomical difference that exists between the rods and the cones (for the long, fine, closely pressed together cones of the fovea are not cone-shaped) is exactly this—that communication with the continuous bi-polar cell is on the one hand by a simple knob, on the other by a group of distinct processes (Figs. 2, VI); this suggests that the difference between a black-white series, on the one hand[1], and sensations in

[1] Black may well be the sensation attached to the resting-stage of the cortical visual process. A state of non-excitation from the external world does not, in the case of the other senses, need to enter consciousness; but in the visual sense the spatial attribute is of extreme consequence, and if we were unconscious of objects which send to us no light there would be lacunae in the retinal spatial field which would be most disturbing. This state of things actually occurs in the case of localized lesions in the cortical visual field; the ophthalmologists distinguish between *negative* and *positive* scotomata—in the latter (disease of retina or optic fibres) a black spot is seen in place of a portion of the external field; in the former, nothing is seen. This fact alone goes far to prove that black is purely a cortical excitation, which enters consciousness as a *mark* of the absence of retinal excitation.

four different tones, on the other hand, has its physiologico-anatomical basis in the provision for disjunct communication between cone and bipolar cell, which is had by means of the several different fibrillae groups of the cone-base. If it were the case that one fibre could convey one form of excitation only, then the four simple colour-tones would have to be mediated by four different contiguous cones (three, in the original Young-Helmholtz theory, which was based solely upon physical, not at all upon psychological considerations). Helmholtz himself, in the last (second) edition of the *Physiologische Optik*, has given up this view, and regards the several photo-chemical processes which underlie colour as taking place all in a single cone. If one cone mediates one colour only, then a point of purple light, so small that its image falls upon a single cone, should look, as the image passes over the retina, now red and now blue according as it strikes one or another of the visual elements that are fitted to respond to it. This and similar phenomena were announced by Holmgren to occur, and were taken by him as being complete confirmation of the Young-Helmholtz theory, so far as this point is concerned; but later experiments from the laboratories of Hering and of König show that such loss of true colour does not take place. Schoute (*Zeitsch. f. Psychol.*, xix. 251) gives good reasons for believing that, in such experiments, the image formed is actually as small as calculation from the constants of the eye would imply. It is true that Graefe (who has examined two perfectly fresh human eyes with the aid of the most modern methods of staining, &c.) finds that the cross section of a foveal cone is 2 μ; it has usually been given as 4 μ, and hence it is possible that the images formed were not small enough to affect individual cones in the fovea. But, on the other hand, images so small as this cannot fall upon more than one cone at a time in the extra-macular region, and here, too, the phenomenon of incomplete response does not take place. The chief consideration by which the physiologists uphold the similar character of all nerve-fibre transmissions is the fact that only one set of electrical reactions occurs, no matter what nerve is involved; but it would be as safe to infer that any two chemical reactions were the same in kind because they were attended by the same production or abstraction of heat (Hering). The question is of fundamental consequence, and it is hardly worth while to devise colour theories until after it has been settled; nevertheless, the physiologists proper and the physiologists for the eye rest content, seemingly, each in his own belief, with very little counter-discussion. It cannot be too much insisted upon, meantime, that the question as it regards the eye must be settled upon its own merits, and not from analogy with other sorts of nerve-fibre, where the assumption of such complexity is not demanded by the facts.

Literature (to I): v. Helmholtz, Handb. d. physiol. Optik (2nd ed., 1896); see also under Optics. (C.L.F., E.B.T.)

II. Light [ME. *light, liht*, AS. *leôht*]: Ger. *Licht*; Fr. *lumière*; Ital. *lume*. The sensation produced by the action upon the retina of a radiation in the ether consisting of trains of transverse waves called light. The sensation is not produced except by waves within a certain range of velocity.

The periods and wave-lengths of these waves may be measured by interference and diffraction methods. The velocity of the waves has been measured by various observers. It has been found that in order to produce the sensation light these waves in the ether must have periods lying between 13×10^{-16} and 25×10^{-16} of a second. Expressed in different words, the wave-lengths of these waves which affect the retina in the method described must lie between 750 and 390 millionths of a millimetre; for the velocity of the waves is nearly 3×10^{10} centimetres per second. A source which emits waves of such periods as to produce light is called a 'source of light'; for instance, a candle, the sun, an electric lamp, a glow-worm. The radiation itself is often, but incorrectly, called 'light.' If this radiation is examined by a spectroscope, it is noticed that the eye perceives different colours in different portions of the spectrum. Consequently, waves of different periods produce different colour-sensations. Four absolutely distinct colours (together with their intermediate colour-blends) are discernible in the spectrum; these are, in the order of decreasing wave-lengths, red, yellow, green, and blue.

In the radiation from any source of light there are also present waves whose periods do not lie within the limits necessary for the production of the sensation light. Some of these trains of waves have periods longer than those of 'light-waves'; others, shorter. The former are called infra-red radiations, and may in general be detected by the rise in temperature of such bodies as absorb them;

the latter are called ultra-violet radiations, and must in general be studied by some photographic process.

These waves in the ether all advance with the same velocity independent of their period or wave-length, provided there is not associated with the ether any form of ordinary matter, using this word in an everyday sense. This therefore is the case in interplanetary space. But if, on the other hand, matter is associated with the ether—for instance, if the waves are passing through any ordinary transparent substance such as glass or water—the velocity is not the same as for the pure ether, being less; and further, waves of different periods have different velocities, the shorter waves having in general the less velocity. This accounts for refraction and dispersion.

Waves in the ether are carrying energy; and, when they reach the retina and are absorbed, their energy is used in producing certain (probably chemical) changes which stimulate the nerve-ends. If the waves are emitted by a small source, their intensity at any point varies inversely as the square of the distance of the point from the source.

It should be noted further that the radiation from a source of light will produce definite physical and chemical effects in material bodies if it is absorbed by certain substances or instruments. Illustrations of this are afforded by photographic action or chemical action in general, phosphorescence and fluorescence, rise in temperature and other heat-effects, and so on.

In order to produce a source of light it is in general necessary to have a high temperature, as is shown by a flame, an incandescent or arc electric light, the sun, and so on. There are cases, however, where bodies may be rendered luminous in other ways than this. Illustrations are given by the Welsbach burners, glow-worms, and in general by phosphorescent and fluorescent substances. Other illustrations are given by the production of light by electrical discharges.

In distinction from trains of waves in the ether it is possible to have irregular transverse disturbances which may also affect the sense of sight. There is no doubt but that the Röntgen rays are illustrations of this kind of disturbance, and that they may under certain conditions affect the eye.

Literature (to II): Preston, The Theory of Light; Tait, Light; Rayleigh, Encyc. Brit., art. 'Light.' (J.S.A.–C.L.F.)

III. The Eye [AS. *eáge*, eye]: Ger. *Auge*; Fr. *œil*; *Ital. occhio.* The end-organ of vision; the mechanism by which vibrations of the luminiferous ether are transformed into the physiological stimulus of visual sensation. (C.F.H.–J.M.B.)

Two important pieces of apparatus for studying the eye are the ophthalmometer (for making various measurements—ophthalmometry—including the curvature of the cornea) and the ophthalmoscope (for viewing the interior of the eye, especially the retina—ophthalmoscopy). (J.M.B.)

A knowledge of both the anatomy and physiology of the eye may be best attained by studying its development in the animal series and in the vertebrate embryo.

Eye-spots in the Protozoa and lowest Metazoa are collections of pigment granules, commonly brownish or reddish, situated in the ectosarc, or (in the Metazoa) in conjunction usually with the cerebral ganglia, or in groups of epithelial cells on the surface of the body. These cells may occur on a level with the general surface, as in some coelenterates, be raised into pigmented papillae, as in the fringes about the mantles and siphons of bivalve molluscs, or drawn below the surface as pigmented sacs or pits, as found in echinoderms, many worms, and in the tips of the tentacles and papillae of numerous molluscs.

It is often stated to be doubtful whether these simple eye-spots give rise to definite sensations of light; the sensations which accompany their reactions to the rays of the spectrum may, for aught we know, be sensations of heat, though there are no known instances among the higher animals (where we can more reasonably infer by analogy their sensations from our own) of a special provision for the *absorption* of heat-producing rays. Moreover, the experiments of Romanes seem to indicate that certain jelly-fishes and echinoderms are sensitive to light and not to heat. It should also be borne in mind that dark pigment is rather an accessory than an essential to vision, as is proved by its absence in albinos as well as in many of the lower animals that are still sensitive to light.

The formation of the eye as a pit lined by epithelial cells lends itself to the development of the accessory structures, lens and other refractive media, iris and cornea, which render visual images possible. Even a simple pit with pin-hole aperture is capable of forming images on the principle of the simple

camera obscura. The secretion of refractive media by the cells forming the pit or sac, and the clearing up of the superficial cells to form a transparent cornea, and their convex thickening to make a corneal lens, are steps which are very easy and which are rapidly taken in the invertebrate series.

In the eyes of invertebrates generally, the cells of the retina, being specialized epithelial cells, retain their original position, i.e. the poles for receiving sensory stimuli point to the exterior, and the basal, or discharging, poles send fibres directly to the brain. In a few cases, notably those of Pecten (Patten) and of Onchidium (Carrière's Fig. 17), the retinal cells are inverted and the optic nerve-fibres spring from their superficial poles and reach the brain by breaking through the bottom of the optic cup (Onchidium and vertebrates), or flow over its rim and thus around to the brain (Pecten). These eyes are probably explained by a collapse of the primitive optic vesicle, such as occurs in vertebrates, to form a secondary optic vesicle with double wall. The cells of the external layer would thus be inverted; lens, cornea, and all accessory structures are then formed, as in vertebrates, by cells of the surrounding and overlying tissues.

Position of eyes in the body depends rather upon the animal's needs than on any fixed laws of structural organization. Ability to see food and natural enemies being a most important factor in fitness to survive, eyes are commonly developed in close association with the principal nerve ganglia. Thus eyes may be scattered over the entire back (Onchidium), where the chief enemies approach from above, or arranged along the mantle-edge or about the siphons of bivalve molluscs, in which retraction and closure of the shell are the important reactions. In the free-swimming embryos of bivalves eyes are present in the head, but atrophy as the shell closes over them. This is generally true of all the higher animals that live in total darkness, in the deep sea, in caves, in burrows and holes in rocks, showing that they are descended from seeing forms and have been crowded into the darkness. With animals that possess a head and move actively about, eyes are situated uniformly in front, paired, or otherwise grouped (insects and arachnids) about the brain. Their positions in the worms are especially instructive as pointing to the relations obtaining in the vertebrates. In the leeches, for example, the eye-spots occur one pair in each of several of the anterior segments.

Morphologically the vertebrate retina is a specialized portion of the original wall of the primitive fore-brain vesicle. Since the neural tube in vertebrates is a strip of superficial epithelium folded in and covered over, its cavity represents the external world. The primary optic vesicles arise very early as paired outgrowths on either side of the first cerebral vesicle, carrying its cavity with them. As they reach the skin, the front wall caves inward, or is possibly pushed inward by the thickening of the epidermis to form the lens, and the secondary optic vesicle results with double wall and the cavity of the primary vesicle is obliterated. The location of this cavity is indicated by the surface of juncture of the two walls of the secondary optic vesicle, and it must be remembered that this surface between the rods and cones and the pigment epithelium represents the external world to the cells of the retina. See Plate A (Brain), Figs. 7, 8. The outer wall now thickens by growth and division of its cells to form the distinctively nervous layers, while the inner wall remains one cell thick and constitutes the pigment layer of the retina, classed with the choroid by earlier writers. The choroid coat then forms over the convex surface of the retinal cup, homologous with the pia, and is continued in front with the pigment layer of the retina, as the iris (Fig. 3). The epithelial cells immediately over the mouth of the optic vesicle elongate, and sinking below the surface, first as a pit and then as a hollow vesicle separated from the skin, give rise to the fibres of the crystalline lens. This takes its position in the optic cup, nearly filling it in the early embryonic stages. Below, the optic vesicle remains open for a time, a furrow in the stalk which attaches it to the brain continuing outward to the rim of the vesicle as the choroidal fissure. Through this the mesoblastic tissue which is to form the vitreous humour flows in behind the lens, and the fissure growing together completes the cup. From the surrounding mesoblast the sclerotic forms, enclosing the whole in a thick tough coat homologous with the dura of the brain and spinal cord. In front the sclerotic is continued as the cornea, a modified form of connective tissue, transparent and free from blood-vessels. The eyelids, when present, are formed by folds of the integument from above and below the cornea meeting along the

median horizontal line. These grow together early in the third month and open (man) shortly before birth.

The skin thus turns inward at the edge of each eyelid as the *conjunctiva*, which after following the lid back, palpebral conjunctiva, is reflected over the eyeball as the conjunctiva bulbi and over the cornea as the corneal epithelium. By everting, or by lifting the lids the lids in the form of tears. Ordinarily this is prevented by the oily secretion of the Meibomian glands situated within the lids, which is poured out along their edges. The lachrymal gland is developed in animals above the fishes. The lids are stiffened by dense plates of connective tissue, *tarsi*, and are supplied with muscles for closing, the orbicularis, and opening, the levator palpe-

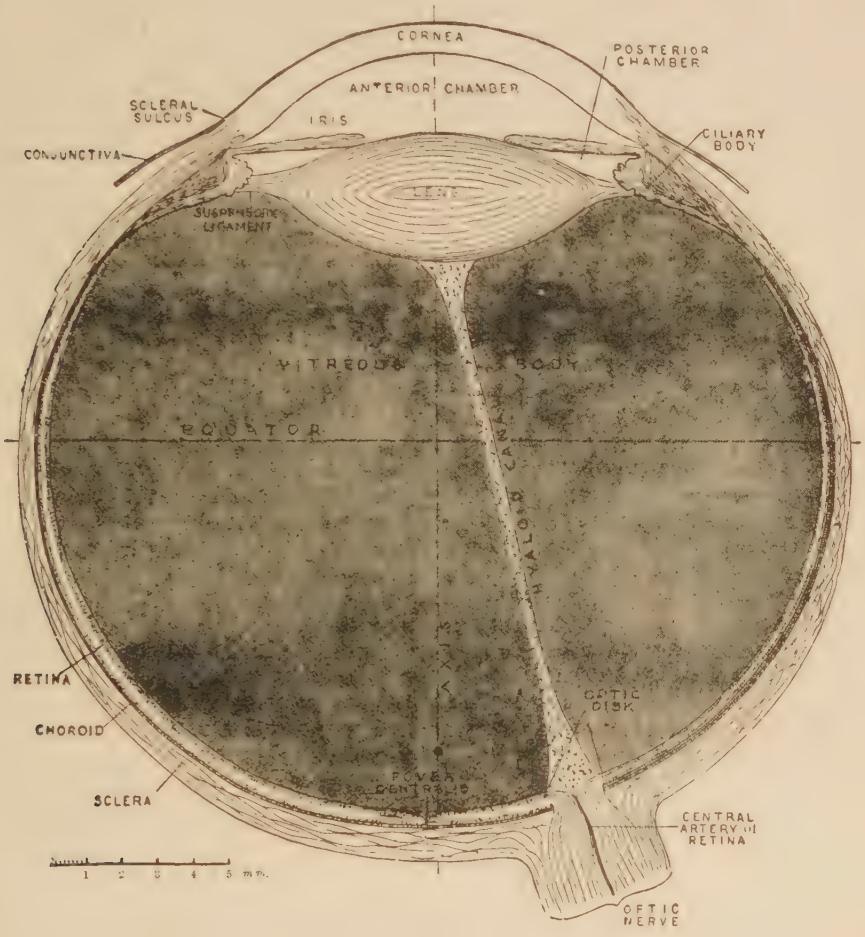


Fig. 3. Diagram of a horizontal section of the left eye, drawn to scale. (Norris and Oliver.)

the lid away from the eyeball, the limits of the conjunctival sac may be seen. Into the upper temporal portion of this sac the lachrymal glands discharge their secretion, which, by the act of winking, keeps the front of the eyeball uniformly moist, and from the nasal angle the lachrymal duct carries off excess of moisture, except such as may overbrae, which is a slender muscle attached at the back of the orbit and inserted by a thin flat tendon along the tarsus of the upper lid. Some animals have a similar muscle for the lower lid. A third eyelid, rudimentary in man, as the plica semilunaris, especially developed in birds, the nictitating membrane, consists of a reduplication of the conjunctiva,

situated in the anterior angle. By a special musculature it can be carried quickly back and forth over the exposed portion of the eyeball.

Movements of the eyes are effected in man by six muscles for each eye: four straight muscles, the superior, inferior, external and internal recti; and two oblique, the superior and inferior oblique. See Fig. 4. The eyeball rests on a soft cushion of fat, which fills the orbit, but is separated from it posteriorly by a lymph-sac, the *tunica vaginalis oculi*, or capsule of Tenon, in which it rotates on practically a surface of lymph.

The human eyeball is formed of segments of two spheres: the larger, about one inch in diameter (24 mm.), the posterior opaque sphere, corresponds to the area of the sclerotic, the smaller anterior sphere (16 mm. diameter) to that of the cornea. Beginning in front with the cornea, the refractive media are: the aqueous humour (practically lymph, the anterior chamber being thus a lymph space), the crystalline lens, and the vitreous humour. In the normally formed eye at rest these media suffice to bring parallel rays, or those coming from objects more than two metres distant, to a focus on the retina. As an object approaches the eye, increased convexity of some refracting medium must be attained to bring the more and more divergent rays to the required retinal focus. This is accomplished by the act of ACCOMMODATION (q. v.), which affects chiefly the form of the lens, and is brought about by contraction of the ciliary muscle. This muscle consists of radial and circular fibres, the latter acting as a sphincter for the suspensory ligament of the lens. The radial fibres are attached about the corneo-sclerotic junction and are inserted along the ciliary body of the choroid coat. The action of both parts of the ciliary muscle is thus to slacken the strain on the lens of the suspensory ligament, according to the theory of accommodation advanced by Helmholtz, and the lens, by its own elasticity, tends to assume a more spherical form. The front of the lens especially becomes more convex,

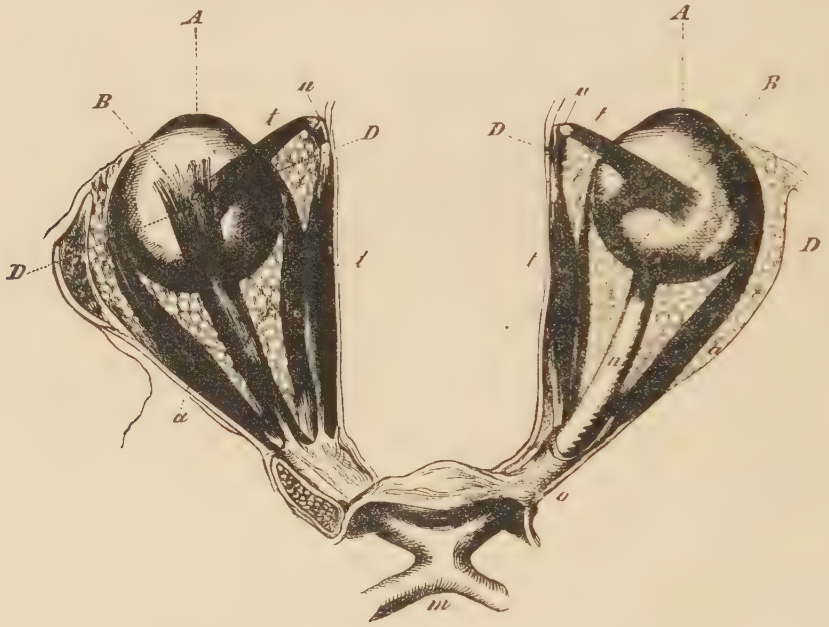


Fig. 4. The muscles of the eye. *A*, axis of the eye; *n*, optic nerve; *o*, *foramen opticum*; *m*, *chiasma nervorum opticorum*. Beyond the chiasm the optic nerves become the optic tracts. *i*, *a*, *s*, the internal, external, superior recti muscles; *t*, superior oblique muscle; *u*, trochlea. *DD*, axis of rotation of the superior and inferior recti muscles; *BB*, that of the oblique muscles; these make angles respectively of 70° and 35° with the axis of the eye. The external and internal recti move the eye about a vertical axis. (Helmholtz.)

its radius of curvature changing from 10 mm. to 6 mm., while the back surface changes only from 6 mm. to 5·5 mm. More recently Schoen has advanced a quite different theory as to the operation of the mechanism of accommodation (Schoen, 'Der Accommodationsmechanismus,' *Arch. f. d. ges. Physiol.*, lix. 427). See Fig. 5, *a* and *b*.

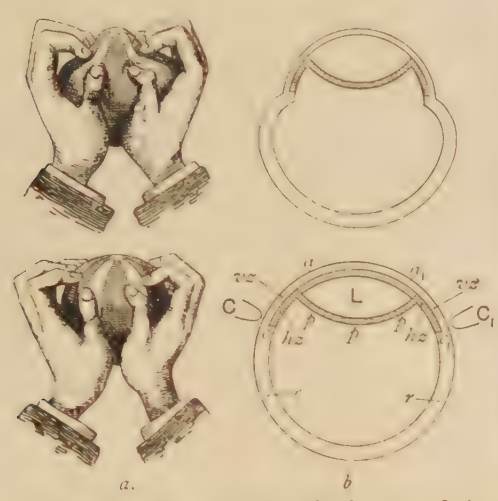


Fig. 5. The actual mechanism (*b*) of accommodation, illustrated by the mechanical action of hand-pressure on a ball of flexible material (*a*). (Schoen.)

For the normally formed eye (see EMMETROPISM) the power of accommodation makes it possible to focus upon the retina rays of any degree of divergence from parallel to those coming from an object from 10 to 13 cm. from the eye. Nearer than this distance, which is known as the 'near point,' accommodation is unable to bring the rays to a focus. Not infrequently eyeballs are longer in the axis of vision, MYOPIC, or shorter, HYPERMETROPIC, than normal; in which cases parallel rays tend to focus, with the eye at rest, either in front of the retina, MYOPIA (q.v.), or beyond the retina, HYPERMETROPIA (q.v.). Hypermetropic eyes are able to focus parallel rays on the retina by an effort of accommodation, which often causes headaches and other nervous symptoms; but since there is no mechanism by which the lens can be rendered less convex, the myopic eye must be provided with concave glasses, to render the rays more divergent, in order to obtain clear images of distant objects. Practically all eyes are hypermetropic at birth, and generally grow emmetropic. Too great strain upon the mechanism of accommodation in early years is probably one of the most serious causes in the development of myopia; heredity is another important factor.

Another important defect is due to irregularities in the cornea, or other refractive media. The corneal surface is the one commonly involved, and if it is not spherical, but ellipsoidal, i. e. flatter in one meridian than another, regular ASTIGMATISM (q. v.), rays penetrating it will not be brought with exactness to a focus, but will be united in two focal lines at right angles to each other and at different distances from the cornea. All except certain sectors of the visual field must therefore be represented, with a given accommodation, by indistinct images on the retina. Regular astigmatism may readily be corrected by cylindrically ground glasses. Irregular astigmatism exists when meridians of refracting surfaces are irregularly curved, i. e. are arcs of neither circles nor ellipses, or when the media themselves are not homogeneous. It is impossible to correct such astigmatism by optical means.

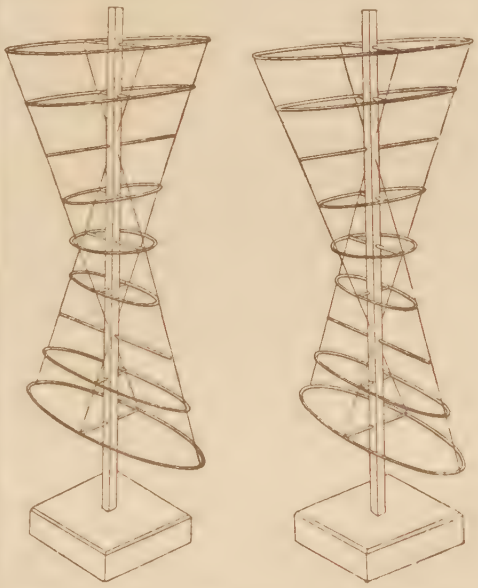


Fig. 5 *c*. Binocular diagram to illustrate astigmatism. By fixating a point a few inches in front of these figures and halfway between them, they can be made to fuse into a single tridimensional figure showing two focal lines at right angles to each other. (Bowditch.)

Spherical ABERRATION (q. v.) is a difficulty encountered in the construction of all optical instruments, arising from the fact that

rays penetrating a lens near its margin are brought to focus sooner than those penetrating near the centre. This is adjusted for in the eye by the iris, which cuts off the marginal rays, and by the structure of the lens itself, which becomes softer, i. e. less strongly refractive, as we pass from the centre towards the margin.

Chromatic aberration, due to the refrangibility of the rays of short wave-length (violet) of the spectrum being greater than that of those of long wave-length (red), is also a defect of the eye as an optical instrument. It may be readily demonstrated by covering one-half of the pupil, when a coloured fringe will appear along a dark line through a bright field, a window-bar against the sky, bluish on one side and reddish on the other. It is compensated for by the fact that, when the eye is accommodated for the middle rays of the spectrum, the violet rays (which will have crossed one another at a focus in front of the retina) will be overlapped by the red rays (which have not yet been brought to a focus), and hence the dispersion circle around the focus of medium rays will be approximately grey in colour, and so overlooked. But if the upper half of the pupil is cut off, only the violet rays from below and the red rays from above reach the retina, and hence coloured fringes are seen.

The retina, the innermost coat, extends over the posterior portion of the eyeball and forward almost to the ciliary body. Here the visual portion ends in a serrated margin, the ora serrata. The pigment layer of the retina extends over the ciliary body, and is continued over the back of the iris as the uvea. The colour of the retina in life is light pink, or purplish red, if kept in the dark, owing to the visual purple (Boll), or rhodopsin (Kühne), of the rods.

According to recent descriptions the human retina, and that of vertebrates generally, consists of eight distinct layers: (1) layer of pigment cells, next the choroid coat; (2) layer of rods and cones; (3) external nuclear layer; (4) external plexiform (a term proposed by Cajal and preferable to the term 'molecular' of earlier writers) layer; (5) internal nuclear layer; (6) internal plexiform layer; (7) ganglion-cell layer; (8) layer of nerve-fibres. The so-called internal and external limiting membranes which appear in sections between the nerve-fibre layer and the vitreous humour, and between the outer nuclear and rod and cone layers respectively, are merely the planes of termination of the supporting cells, fibres of Müller, of the retina; see Plate I (Vision), Fig. 6 B. The blood-vessels, a central artery and vein, enter and leave by the optic nerve. They are distributed to all layers except the outer nuclear and rod and cone layers; and since the shadows of the retinal capillaries are plainly visible, the actual mechanism for the transformation of light-vibrations into something which gives rise in the brain to visual sensations must lie within these layers. Structurally, the rods and cones are peripheral portions, receiving poles, comparable to sensory hairs or coalesced pencils of sensory cilia, of the originally superficial cells, whose nuclei are those of the external nuclear layer, and whose central, discharging, poles are fibres which break up into terminal brushes in the external plexiform layer. The rods and cones are thus, with little doubt, the real transformers of visual stimuli, the specialized receiving organs for all sensations of light and colour.

From the above description it is clear that light must penetrate six layers of the retina before reaching the rods and cones. This is not of great consequence, since, when alive, the retina is nearly transparent, but in animals generally a certain part of the retina is thickened either along a band corresponding to the image of the horizon line, as in some of the herbivora, or in a round or oval area near the axis of vision, where the retina is most used, the central area or *macula lutea* in man and primates. In man, primates, most birds, and a very few reptiles, amphibians, and fishes, a pit forms in the centre of the thickened area, in which the other intervening layers of the retina and all blood-vessels draw aside and leave the cones directly exposed to the light. The thickened portion is generally known as the macula lutea, from its yellow colour, and the pit or depression as the fovea or fovea centralis. While the rods greatly outnumber the cones in the peripheral portions of the retina, the cones grow proportionately more and more numerous as we approach the centre, and in the fovea itself only cones are present. A number of birds, notably among the raptores and swallows, have two foveas, a temporal fovea for binocular vision and a nasal or median fovea for monocular vision. It is now well established that moving objects are more quickly perceived by the portions of retina rich in rods, and in animals, like the frog, which apparently only see objects in

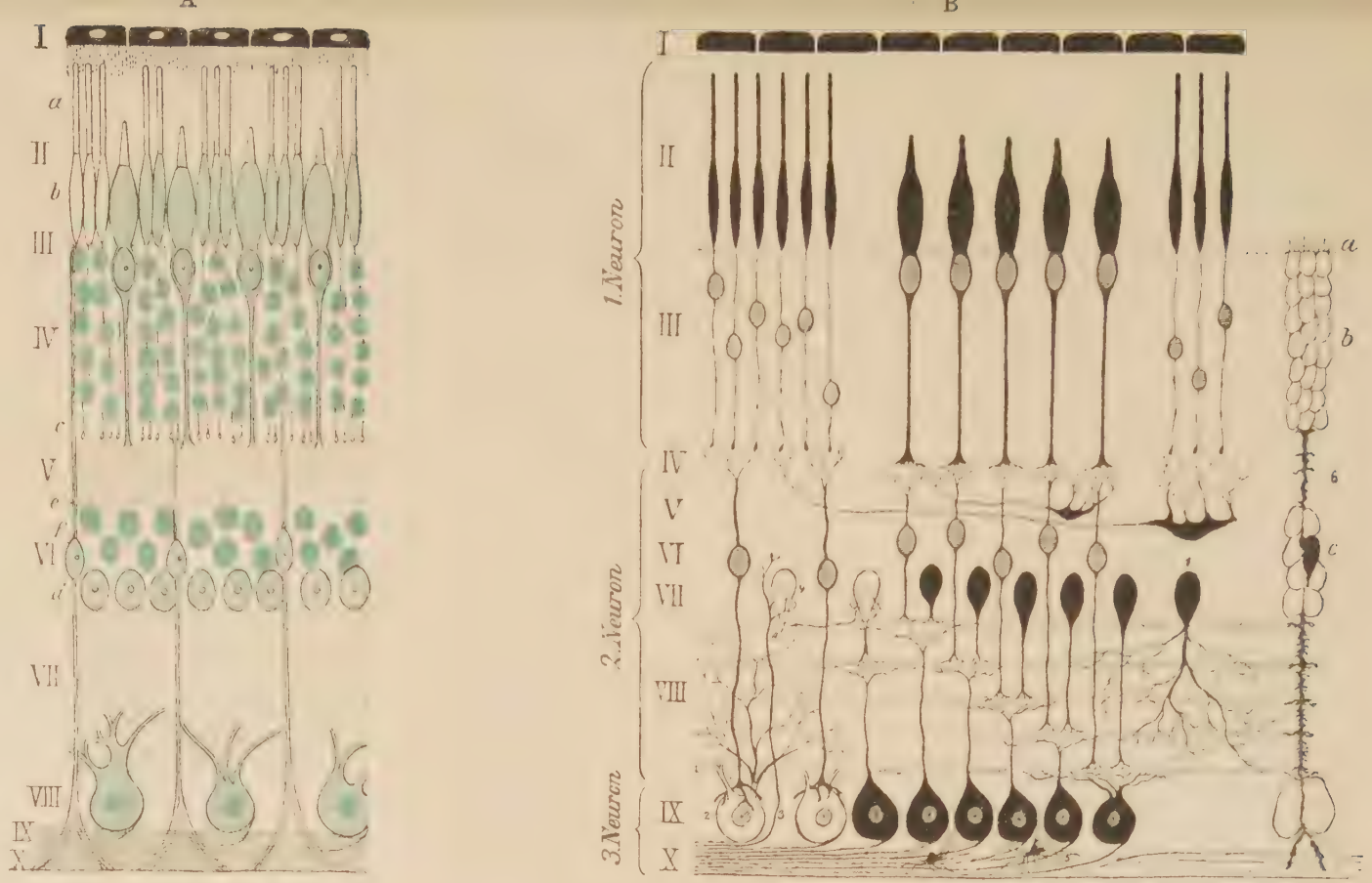


PLATE I (**Vision**).

Fig. 6. A. The human retina. I, pigment epithelium; II, rods and cones—*a*, outer members; *b*, inner members; III, membrana limitans externa; IV, outer nuclear layer; V, outer granulated layer; VI, inner nuclear layer; *d*, spongioblasts; VII, inner granulated layer; VIII, layer of the ganglion cells; IX, layer of nerve-fibres; X, membrana limitans externa. Coloured with haematoxylin. (Graefe and Saemisch.)

B. Structure of the human retina schematic. (Greef. I, pigment epithelium; II, rods and cones; III, nuclei of visual cells; IV, outer plexiform layer; V, layer of the horizontal cells; VI, layer of the bipolar cells; VII, layer of the amacrine cells; VIII, inner plexiform layer; IX, layer of ganglion large cells; X, layer of fibres; 6, supporting fibre of Müller. (By the Golgi method.

Dict. Philos., vol. ii, p. 774.]

motion, the rods greatly predominate even in the central portions of the retina. On the other hand, minute vision of stationary objects is only possible in the fovea.

Sömmerring (*Sm. Th.*, v. 1798) discovered the fovea and considered it a foramen. Buzzi (1796) thought the fovea to be a thin transparent part of the retina.

The optic nerve-fibres gain their medullary sheaths as they pass through the lamina cribrosa of the sclerotic coat. At this point, the porus opticus (optic disk, papilla), all the layers of the retina are forced aside to admit the passage of the nerve, and as vision is consequently also interrupted here, the spot is known as the 'blind spot' (Mariotte's spot, 1668).

Some (Quain) still describe the optic nerve as spreading out within the eyeball as the innermost layer of the retina. This is true (His, Cajal) of but a very few of its fibres, which have been proved to grow from the centres to the retina as possibly motor or associational fibres. Since the researches of His, Martin, and Mall (1890–3) have demonstrated that the optic nerve-fibres, in common with sensory nerves generally, arise as axones of the large ganglion cells and grow centripetally to the optic centres, it would seem advisable to reverse the older descriptions and consider the optic fibres as gathering from all points of the retina, uniting in the optic nerve, and distributing themselves to the optic centres in the brain. In line with this we should also reverse the numbering of the layers of the retina, as is done above.

The optic fibres from the right-hand half of each retina proceed to the right cortex, from the left-hand half to the left cortex, but a small portion of the retina, about coincident with the yellow spot, is doubly provided for, and may preserve its function when either half of the cortex is destroyed (Fig. 7).

The principal axis of the eye is a line joining the centres of curvature of its refractive media. The axis of vision is a line drawn from the fovea to the point looked at. For the eyes at rest or while looking at a distant object the axes of vision of the two eyes are nearly parallel; as the object approaches they converge, the sensations of strain from the oculo-motor muscles furnishing important data in judgments of distance. Additional advantages of binocular vision are increased size of visual field, perception of the depth of points not fixated upon by means of double images, and correction of errors of one eye by the other. If for the primary position we imagine that the retinal cups be exactly superimposed so that one fovea lies over the other, each point in the superimposed retina corresponds nearly with the point directly beneath it in the other. These are known as 'identical' or corresponding points. All images falling upon identical points of the two retinae are projected into space as single points. The line or plane passing through all such points is called the Horopter (q.v.). All points out of the horopter, while we commonly disregard them, form images which are projected, or seen, as double. Standing erect and looking towards the horizon, according to Helmholtz, the horopter stretches out as a line coinciding with the plane of the ground upon which we stand. With each position

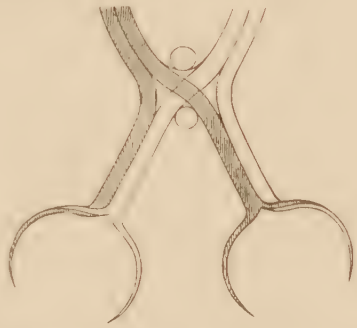


Fig. 7. Scheme of the crossing of the optic nerve in the chiasm of man. The visual nerves with their retinal expansions are seen from above; the optic tract of the right side is shaded, that of the left is white.

of the eyes the form of the horopter changes. With the eyes converged, the horopter is a circle passing through the fixation point and the nodal points of the two eyes. This is known as the 'circle of Müller.'

Literature (to III): Carrière, Sehorgane d. Thiere (1885)—best general treatment of the subject from standpoint of comparative morphology; Quain, Anatomy, iii. Pt. III, Organs of the Senses; G. Schwalbe, Lehrb. d. Anat. d. Sinnesorgane (1887); S. Ramon y Cajal, Retina d. Wirbelthiere (1894); J. H. Chievit, Arch. f. Anat. u. Entwickelungsgesch. (1891), 322; and Ueber die Entwickelung der Area und Fovea Centralis retinae, ibid. (1890), 232–366; J. S. Slonaker, Comparative Study of the Area of Acute Vision in Vertebrates, J. of Morphol., xiii. 445–502 (1897); W. Patten, Eyes of Molluscs and Arthropods, Mitteil. d.

zool. Stat. zu Neapel, ii (1886); S. Watase, Morphology of the Compound Eyes of Arthropods, Quart. J. Microsc. Sci., June, 1890; H. v. Helmholtz, Handb. d. physiol. Optik (1896); Cohn, Lehrb. d. Hygiene des Auges (1892); Schoen, Pflüger's Arch., lix. 427.

(C.F.H., C.L.F.)

IV. The Eye as an Optical Instrument. For details in regard to the deflection of ether radiations out of a straight course by means of lenses, see the various textbooks. The eye is essentially a combination of lenses adapted to throwing an image of an external object upon a delicate expansion of the optic nerve, the retina (Figs. 8 *a* and *b*). It is in effect a dark chamber, or *camera obscura*, like that of a photographic apparatus, in which the light from any object within its field is thrown by refracting media upon a background so placed that the rays diverging from any given point converge to the corresponding point of a small inverted image. That the image is inverted is of no consequence in our perception of objects. If an arrangement of pins in the shape of an arrow be pressed upon the arm, we can tell whether the head of the arrow be pointed up or down, because we have always seen the surface of the arm, and felt it with the other hand, and hence we know it as an object, as well as by its subjective local signature. But we know nothing about the back surface of the eye, nor about the images that fall upon it. We do, however, know about its front surface, from the eyes of others, and from our own as seen in a mirror, and the only apparent want of harmony that could exist would be if our eye had to turn downwards in its socket to see an object which we have to reach the arm up to. Consciousness does not descend (like a person !) into the eyeball along the optic tract and nerve, and view the image upon the

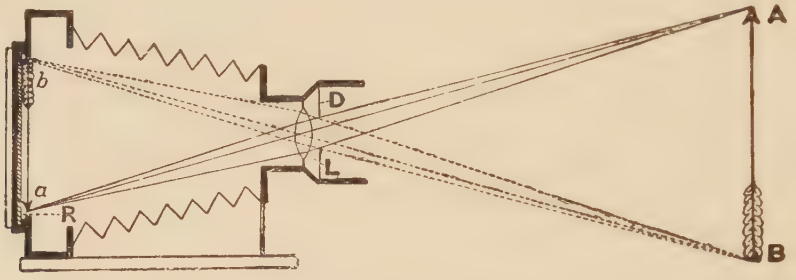


Fig. 8 *a*. Camera obscura of a photographic apparatus. *A B*, object; *D*, diaphragm for shutting off too divergent rays; *L*, lens for refracting the rays so that they will form the image *a b* upon the sensitive plate *R*. (After Norris and Oliver.)

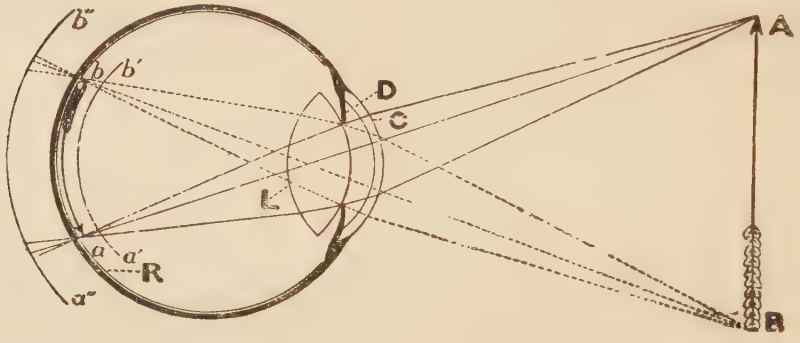


Fig. 8 *b*. The eye as a camera. *A B*, object; *C*, cornea, where the rays undergo a first refraction; *D*, the iris, which acts as a diaphragm for shutting off too divergent rays; *L*, lens, where the rays are again refracted; *R*, retina, upon which the image *a b* is projected; *a′ b′* represents the surface of a hypermetropic eye, and shows that the rays are not completely focussed, and that the image is consequently blurred and indistinct; *a″ b″* represents the surface of a myopic eye, and shows a similar condition. (After Norris and Oliver.)

retina. If she saw anything as an object, it would be, probably, the image which is transferred from the retina to the occipital lobe; in that, however, a re-inversion takes place (Henschen), and she can there, if she likes, gaze contentedly at a (chemical) image which is right side up. But there is no more reason that she should feel the inversion of the images upon the retina than that she should be aware of the coming to a point of all the direction-lines within the crystalline lens, or of the semi-decussation of the visual currents in the optic chiasm.

By computing the effects of each of the lenses in turn, the total effect of the several refracting surfaces of the eye might be separately calculated, but it has been shown that for any system of centred spherical surfaces there exist six points, known as cardinal points (first and second focal, first and second principal, first and second nodal points), such that if the position of these has been determined, the direction of all rays of light through the system may be readily traced. The optical axis is the common perpendicular to the several refracting surfaces, and the focal and principal planes are planes perpendicular to this axis through the corresponding points. The rule for the construction of images is then this: any ray emanating from a point on the first focal plane passes from the first to the second principal plane in a direction parallel to the axis, and thence proceeds in a direction parallel to the line which joins the starting-point to the first nodal point. The refracting surfaces of the eye may be still further simplified, and a 'reduced eye' constructed, which is sufficient for practical purposes. This is regarded as consisting of a single refracting surface of these constants:

Index of refraction . .	1·33
Radius of curvature . .	5·017 mm.
Distance from front surface of cornea to principal point (regarded as one) .	2·148 mm.

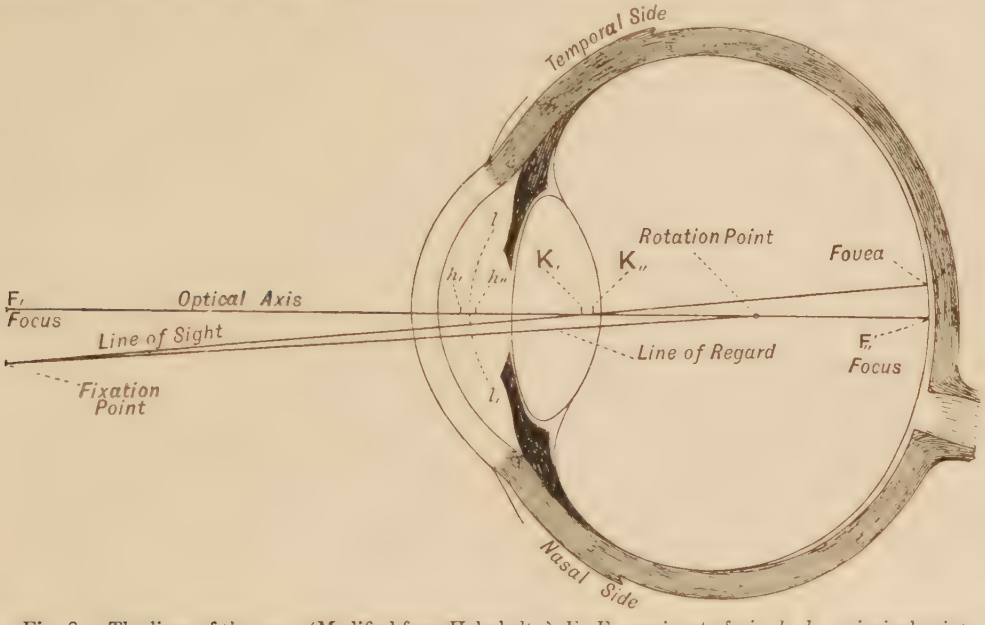


Fig. 8 *c*. The lines of the eye. (Modified from Helmholtz.) $F_{,}$, $F_{,,}$ conjugate foci; $h_{,}$, $h_{,,}$ principal points; $K_{,}$, $K_{,,}$ nodal points; l, $l_{,}$ refractive surface of the reduced eye.

Distance from posterior surface of lens (forward) to nodal point . . .	·04 mm.
Distance from first principal focus to anterior surface of cornea . . .	28·918 mm.
Distance from anterior surface of cornea to second principal focus . .	22·231 mm.

The optical power of the eye is equal to 50·8 dioptries. The optical power of any lens is the reciprocal of its focal length; the dioptry, or unit of optical power, is the power of a lens with a focal length of 1 metre.

The principal lines and points of the eye are given in Fig. 8 *c*. The point of regard is

the fixation point of the eye at any moment; it is, under normal circumstances, the same for both eyes, and hence it is also the point of convergence. The rotation point is that point in the eye which remains fixed as the eye moves about in the socket. It is 11 mm. behind the plane through the edge of the cornea, or 13·5 mm. behind its vertex, and 10 mm. in front of the back surface of the sclerotic coat. Its position is fixed by the shape of the back half of the eyeball, which is flatter than the front half—it is, in fact, the centre of this half-ellipsoid. The eye can rotate, with effort, 50° to each side, and 45° up and down; the field of regard (the sum of the points which can be made fixation points) is therefore, in extent, a right angle in the vertical direction, and a little more than that in the horizontal direction. The field of sight is the extent of space that can be seen with the eye at rest. The line of regard is the line from the point of regard to the centre of rotation. The movement of the eye may be resolved into rotations about three axes—the sagittal, which coincides with the primary position of the line of regard (its position when, with the body erect and the head held symmetrically, we look at the middle point of the distant horizon), the transverse and the vertical (which are at right angles to it and to each other). A line of direction is the unbroken ray of light through any point of an object looked at and through the nodal point of the eye, to the corresponding point of the image on the retina. The principal line of direction, that through the fixation point, is called the line of sight; it makes an angle of 5° with the optical axis (the eye is an optical instrument which is not well centred—the point of acute vision, the fovea, is not at the meeting-point of the optical axis with the retina). The line of regard is inside the line of sight, as the rotation point is presumably in the optical axis, and hence medianwards from that line. The plane of regard is the plane through the lines of regard of the two eyes. Cf. Eye-movements.

The centre of the blind spot is about 15° nasalwards from the fovea. Its cross section is from 3° to 9°, on the average 6°, in the eye of Helmholtz 7°, or from 1·4 to 1·7 mm. on the surface of the retina, that is, about the size of a man's face at the distance of two metres. For the determination of the size upon the retina x of the image of an object X which is at a distance p, in mm., from the anterior surface of the retina, we have, from the consideration of the similar triangles involved (since the distance from the nodal point to the retina is approximately 16 mm., and from the nodal point to the anterior surface of the cornea 7 mm.), the formula—

$$x = X \frac{16}{p+7}.$$

All optical instruments for the formation of images must have power of adjustment, for objects at different distances, sending rays of light through a fixed system of lenses, form images at different distances. This adjustment may be secured by moving the receiving surface further back, as is done in the *camera obscura* of the photographic apparatus, or by increasing the index of refraction of one or more of the media, or by a diminution of the radius of curvature of one or more of the surfaces. The first of these means was formerly the one supposed to be made use of in the eye, the eyeball being assumed to be elongated for viewing near objects. But it is now supposed that the change takes place in the shape of the crystalline lens, brought about by means of the ciliary muscles; from a teleological point of view the lens would be superfluous were it not for its performing this function, for the amount of refraction that takes place at its surface could be produced by a slightly greater curvature in the cornea. The far-point for the normal emmetropic eye (the furthest point at which objects can be distinctly seen) is at an infinite distance; the near-point varies with age, and in early adult life is from 10 to 13 centimetres from the eye. No accommodation is necessary for objects more than two metres distant.

Literature (to IV): see Optics; also the textbooks of physiological psychology; Bowditch, in Howell's Textbook of Physiology (1900).

V. Action of Light on the Retina. That the retina of certain animals was sometimes red had been remarked before, but it was discovered by Boll (1876) that this red colour is bleached out by light, and that it becomes restored if the animal is kept in the dark. The green rays of light are those which are most effective in bleaching out its colour, corresponding to the fact that green light is most absorbed by a substance whose colour is a purplish red. In the human eye an intermediate stage in the bleaching out of this substance occurs in which it is yellow; and the presence in the retina of varying amounts of the visual purple and the visual yellow gives

rise to a succession of colours—purplish red, pure red, brick-red, orange, chamois, yellow. The regenerating purple does not go through the yellow stage. Regeneration takes place through the agency of the pigment epithelium; it goes on in the dark, even in the extirpated retina, so long as its outer surface is in contact with the pigment epithelium, and even if it has been removed and then laid on again. If a sharp image be thrown upon an eye in a state of darkness-adaptation, the eye being held immovable if the animal is alive, the light reflected from the bright portions of the object will cause its visual purple to fade out; images thus formed may be fixed and examined at leisure. They were called optograms by Kühne, who first prepared them. The visual purple cannot be seen in the ordinary eye, on account of the red colour of the background against which it is thrown; but there are a few fishes which have a white retinal tapetum, by means of the reflected light from which it is easy to see the colouring matter of the rods in its various different conditions (Abelsdorff). On looking into the eye of such an animal after it has been kept in the dark, the retina is seen to be first of a rose-red colour and then to change by gradual stages into a brilliant white. The relative absorption by the visual purple of the different radiations of the spectrum has been determined with great exactness by Professor König; he finds it to coincide with the subjective relative brightness-values of the totally colour-blind, and also with the relative brightness-values of the normal eye in a faint light. The coincidence of the curves representing these last two brightness-spectra had already been shown by Hering and Hillebrand (*Sitzber. Akad. Wiss. Wien*, 1889).

Other changes produced in the retina by light are the descent of the small black crystalline granules of the pigment epithelium into the spaces between the visual elements, and also variations in the resting electrical current between the surface of the retina and that of the optic nerve.

Literature (to V): Fr. Holmgren, Methode um die Wirkung von Lichteindrücken auf die Retina objectiv kenntlich zu machen, Upsala Läkaref. Förh. i. (1870), 177; Dewar and McKendrick, On the Physiological Action of Light (1874); F. Boll, Zur Anat. u. Physiol. der Retina, Sitzber. Akad. Wiss. Berlin, 23. Nov. 1876; W. Kühne, Untersuch. a. d. physiol. Inst. d. Univ. Heidelberg (1877–81); Parinaud, L'héméralopie et les fonctions du pourpre visuel, C. R. Acad. d. Sci. 95 (5), 286 (1887); Abelsdorff, Die ophthal. Erkennbarkeit d. Sehpurpurs, Zeitsch. f. Psychol., xiv. 77 (1897); König, Ueber den menschlichen Sehpurpur u. seine Bedeutung für das Sehen, Sitzber. Akad. Wiss. Berlin, 21. Juni 1894; Hering and Hillebrand, Ueber d. specifische Helligkeit d. Farben, Sitzber. Akad. Wiss. Wien (1889). (C.L.F.–E.B.T.)

VI. Colour-Theory: Historical. Ger. *Farbenlehre, Theorie der Wahrnehmung der Farben*; Fr. *théorie de la perception des couleurs*; Ital. *teoria della percezione dei colori*. The ancients were struck by the fact that coloured surfaces reflect less light than white ones, and hence they regarded the colours as made up by mixing black and white together (Aristotle). This was the prevailing theory up to rather recent times, and it was even defended by Goethe. The solution of the problem of colour in the physical sense is due to Newton; he proved that white light may be separated into light of different colours, that homogeneous spectral light does not have its colour further changed by a second reflection or absorption, that rays have different refrangibility, and that the colours of natural objects are due to the different ways in which they absorb and reflect different sorts of radiations. But Newton also was the first to lay down the fundamental principle of sensation in general, that it is of purely subjective character and has no necessary connection in kind with the physical cause that brings it forth. Newton says, 'The rays, to speak properly, are not coloured. In them is nothing else than a certain power or disposition to stir up a sensation of this or that colour. . . . So colours in the object are nothing but a disposition to reflect this or that sort of rays more copiously than the rest.' He supposed that the rays of light, 'by impinging on stiff refracting superficies, excite vibrations . . . of various bigness; . . . and therefore the ends of the capillamenta of the optic nerve, which pave or face the retina, being such refracting superficies, when the rays impinge upon them, they must then excite these vibrations, which vibrations . . . will run along the aqueous pores or crystalline pith of the capillamenta through the optic nerve into the sensorium.' It is difficult to imagine that there can be a sufficient number of optic filaments to respond in their vibration to all the different sorts of light (especially as difference in position upon the retina must be

the physiological correspondent of difference in spatial quality); this difficulty was met by Thomas Young with the hypothesis that all the colours may be simply combinations in various proportions of a certain number of elements—'each sensitive filament of the nerve may consist of three portions, one for each principal colour.' It was thus again a physicist and not a physiologist who added to our knowledge this important conception, that in the one-to-one correspondence between external nature and internal sensation (and even between external nature and physiological process) a series of continuous differences on the one hand can be pictured on the other by the union in a constantly varying proportion of a smaller number of constituents. But it was the physiological difficulty of imagining a sufficient number of tuned retinal fibres for all the rays of light, and not the deliverance of consciousness in regard to the unitary character of certain principal colours, that gave foundation for the constituent theory of light and colour. This accounts for the fact that three colours instead of four were considered to be a sufficient number of constituents (yellow was regarded as a mixture of red and green, although it is in no sense a reddish green or a greenish red), and no separate physiological process was assigned to the production of the totally different achromatic sensation, white or grey.

The physical facts of colour-mixture were of course known from the earliest times, and were brought into special prominence by the painters. Pliny states that the early Greek painters, who used only four pigments, succeeded in getting better effects with them than the painters of his time, who made use of a larger number. Nevertheless, the hypothesis of Young fell on unappreciative ears, but it was revived by Helmholtz in 1860, and has been the favourite view of the physicists ever since. The failure to recognize the fact, first made plain by Helmholtz, that mixtures of pigments are not the same thing as mixtures of colour (the former are a phenomenon of subtraction and not of addition) was the cause of much confusion and error. In his first experiments with spectral lights, Helmholtz could make grey only out of yellow and blue; this led Grassmann to a restatement of the fundamental principles of colour-mixture and of their graphical representation. A later series of experiments of Helmholtz by a better method removed the apparent contradictions. The principles of Newton's law of colour-mixtures were also proved experimentally by Maxwell in 1857.

The theory of Young, in so far as it posits a small number of colour-constituents, is still the accepted theory, but in so far as it takes no account of the fact that yellow and white are simple sensations and not a psychological blending of two or more constituents, it has never made any appeal to the psychologist; we have in the purples an example of a sensation which *must* be a blend of several sensations, for there is no physical cause for their production except the combination of the causes of blue and of red; we therefore know the character of a colour-blend, and we know that white and yellow are sensations wholly destitute of this character.

Endless confusion has arisen on account of the extreme ambiguity that prevails in the terms used in connection with vision. *Light*, to begin with, is used indiscriminately for the light-sensation and for the photogenic radiations which are given off by bodies whose molecules are in a state of rapid vibration: it is impossible at present wholly to avoid this difficulty, but it would be desirable to use the terms *light-sensation* (Lichtempfindung) and *photogenic radiations* where the context renders the meaning at all obscure. So *colour* should be used in its subjective sense, and *xanthogenic*, *kyanogenic*, *chlorogenic*, and *erythrogenic radiations* should be substituted for the physical cause of colour.

But perhaps the worst confusion has occurred in speaking of the facts of what is called colour-mixture, when it is intended to designate the mixing of different rays or regions of the spectrum. For instance, 'orange' is sometimes a mixture of erythrogenic and chlorogenic radiations; it is not, however, psychologically, a mixture of red and green, but of red and yellow. Just as important, on the other hand, is the fact that perfectly homogenous photogenic rays of wave-length λ 492 are, psychologically, a bluish green or a greenish blue. Again, a certain *physical mixture* of orange and olive radiations will give a pure (but whitish) green, which as a colour sensation is not at all a mixture. To escape from this ambiguity it is absolutely necessary to employ distinctive terms. *Mixture* should be used for the physical procedure only. The various different psychological effects of light-ray mixtures may then be referred to as: (1) *colour-blends*, when the elements of the mixture are still perceptible in the result, as blue and green in the blue-

greens, or peacocks; (2) *colour-fusions* (or *colour-extinctions*), when the elements of the colour have disappeared in the process of mixing, as red and green in making yellow, and yellow and blue in making white. This is not the sense in which Külpe uses the term *fusion* for sensations in general, but it is indispensable to have the word for the results of colour-mixture. We should then say that the spectral yellow-green, when produced by homogeneous light, is not a colour-fusion, but a colour-blend, and that yellow when produced by red and green light is not a colour-blend, but a colour-fusion. (C.L.F.)

VII. Visual Sensation, and Light-Sensation (with Colour-Theory): Ger. *Gesichtsempfindung*, *Licht- (und Farben-) empfindung*; Fr. *sensation visuelle*, *sensation de la lumière*; Ital. *sensazione visiva*, *sensazione di lume*. The term light-sensation is to be preferred, since it is better that the term 'visual sensation' should include the spatial element. For the foreign equivalents of *Colour-Theory* see above, VI. Visual sensations are of two very different kinds as regards quality—chromatic (the colours red, purple, yellow, &c.) and achromatic (the series white-grey-black). It is hard to find a good word for the latter series: (1) by an extension of its meaning (such an extension as is very natural to the mathematician) grey may be made to include the end members of the series black and white; in fact, Kirschmann has shown that when looked at through a tube, so that there is no opportunity for comparison with surrounding objects, there is no such thing as black and white; every achromatic surface is thought to be of some shade of grey; (2) Fick has called the sense which mediates colour the *specific* light-sense, and the other the *absolute* light-sense or plainly the light-sense—this latter term is in agreement with the universal usage of the ophthalmologists, and the phraseology is to be commended; (3) by Hering and his school the members of the achromatic series are spoken of as 'brightnesses.' Müller has shown that any given grey represents at once a definite quality (this is what was formerly not recognized) and a definite intensity, or stimulus energy. It is perfectly legitimate to speak of a given grey as a 'brightness' when regard is had to the voluminousness of the sensation, that is, to the subjective aspect of the *stimulus energy*; but to speak of its *quality* as a brightness is to introduce confusion, for it is impossible to give up the use of the terms bright, dull, brightness, darkness, in the other sense, and in fact no effort is made to do so by writers who make use of this language. By the brightness of the most saturated yellow-green that we can produce, viz. that got by throwing yellow-green spectral light upon a portion of the retina which is already carrying a yellow-green after-image (even when Hering believed in the specific brightening and darkening powers of green and of yellow respectively he must have granted that there was a certain stage of the mixture where neither took place), Hering means the amount of the black-white constituent. But there is no reason for believing, in this case, that there is any black-white constituent present at all. It is, however, quite impossible for one who does not accept the theory of Hering to understand the meaning which he attaches to 'brightness[1].' (C.L.F.)

Visual sensations are of two kinds: colours and brightnesses. The 'colours' are red, green, yellow, &c.; the 'brightnesses' are white, grey, black: the qualities of both series are equally simple.

(1) The brightness qualities fall between the limits of intensest white and deepest black. They form a one-dimensional manifold, and lie upon the axis of the tridimensional figure which represents the sum-total of visual sensations (colour sphere, double cone, double pyramid, &c.). They are probably the earliest type of visual sensation.

(2) Colours fall naturally into four series: red to yellow, yellow to green, green to blue, and blue to red. The four terminal colours of this series are named principal colours; the intermediaries, mixed colours.

An impression of 'colour' is fully characterized by the statement of (*a*) its colour tone or hue, (*b*) its brightness, and (*c*) its saturation. Colour tone is colour quality in the narrower sense—redness, blueness, &c. Saturation is the name given to the degree of distinctness with which a colour tone stands out from its attendant brightness quality; it expresses the 'distance' that separates the given colour from any quality of the brightness scale. Saturation is principally a function of the purity (homogeneity)

[1] The term 'brightness' is used in Hering's sense by E.B.T. It should be noted that the writers of this article, E.B.T. and C.L.F., are upholders of different theories of colour-vision, and their opinions are of necessity in some degree reflected in their respective contributions.—J.M.B.

of light; it is secondarily dependent upon intensity and wave-length. Colour brightness is the grey equivalent of the colour impression, the brightness quality which the impression would show were colour tone abstracted without alteration of stimulus energy. For any given wave-length and state of adaptation of the retina, it is dependent upon light intensity. König has compared the subjective distribution of brightness in the spectrum with the objective distribution of energy (Langley); he finds that a given amount of energy of ether-vibration is by far the most effective for the light-sense saturation. Distance from the black-white axis indicates degree of saturation.

The number of discriminable brightness qualities is estimated by König at 660, by Külpe at 800; that of discriminable spectral qualities (conventional 'colour tones') by König at 160, by Külpe at 150. The estimation of 'mixed' colours varies, in recent books, from 40,000 to 'several hundred thousand.'

(1) We have spoken of the brightness of a visual sensation as a 'quality.' It is a peculiar characteristic of these sensations that change of stimulus intensity is correlated always with change of brightness quality; so that the quality and intensity of a visual sensation are not independent variables. Visual sensations possess intensity; only, this must be termed 'intensity,' and not brightness ('intensity' of sensation being understood as that attribute of sensation whose continuous variation leads either to the point of complete disappearance—zero point—of the sensation, or in a direction precisely opposed to this, i. e. 'decrease' and 'increase' of intensity).

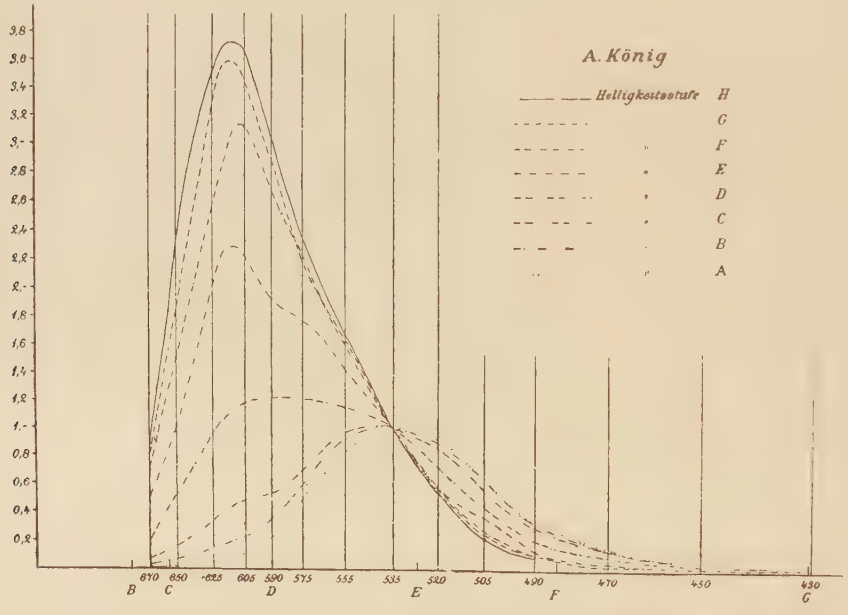


Fig. 9. The relative brightness of the different parts of the spectrum for various different illuminations: from *H*, a strong light, to *A*, a very feeble light.

in the green, the maximum being at λ 505 (Helmholtz, *Festgruss*, 1891, 365). In Fig. 9 is shown the subjective distribution of brightness in the spectrum at various different illuminations: for a strong light the brightest part of the spectrum is in the yellow; when the light is so faint that colours are no longer discernible, it is in the green.

Colour tones may be represented upon the planes of longitude of the colour-sphere, cone, or pyramid; the purest tones are around the equator or base, the principal colours at the four corners in the case of the pyramid. The planes of latitude give surfaces of equal brightness, but of varying colour tone and

(2) The phrase 'primary colours' or 'fundamental colours' is of frequent occurrence. These colours differ, according as

they are fundamental for colour-mixture, for the art of painting, or for a particular theory of colour-vision. The psychological primaries —those which appeal to introspection as of cardinal importance—are the four 'principal' colours mentioned above.

There are two chief theories of visual sensation (cf. section VI of this article). (1) The first is the Helmholtz theory, based on the theory of Young. Every light stimulus sets up three distinct and elementary processes of retinal excitation, which in isolation correspond to the 'primary' sensations of red, green, and violet (or blue). The quality of a given impression depends upon the proportion of these partial excitations in the total excitation; the nearer the balance, the less saturated the colour—so that at equality we see simply grey light. This theory explains the facts of colour-mixture, which originally led to its formulation; it breaks down in face of the other facts of colour-vision. (*a*) So far from brightness sensations being dependent on colour, they persist after loss of colour: in indirect vision, in total colour-blindness, in extremes of illuminative intensity and duration. (*b*) Complementariness and its expression in partial colour-blindness can be explained on this theory only by the auxiliary (and highly improbable) hypothesis of a shift of the elementary excitabilities. (*c*) After-images cannot be explained as due to fatigue and recuperation; there is neither opportunity for recuperation, nor in daily life sign of fatigue. Visual fatigue must, therefore, carry its own corrective with it.

(2) The second theory is that of Hering. There are three visual substances, each liable to assimilative and dissimilative excitation. These substances furnish the six fundamental sensations: green and red, blue and yellow, black and white. The black-white substance is more easily excitable and more plentifully represented than the other two. Light of different wave-length affects the different substances differently (valence of stimulus). All light dissimilates the black-white substance; its assimilation comes from within. Dissimilation and assimilation in the same substance neutralize each other ('antagonistic' processes).

These assumptions explain the distribution of brightness in the spectrum, the facts of colour-mixture, complementariness, indirect vision, after-images, &c. Contrast and ADAPTATION (q. v.) offer no difficulty; they are explained by reference to the excitability of the visual substances and the indirect effect of retinal stimulation. There is, however, a serious difficulty in the fact that we have a black-white sensation (grey), but no red-green or blue-yellow sensation. 'Antagonism' has two different meanings in the two contexts. The difficulty is removed by G. E. Müller's hypothesis that black and white are retinally antagonistic, and grey a cortical sensation. Müller has given the Hering theory a stricter and more elaborate formulation in other respects: e. g., as regards assimilation and dissimilation, the mechanism of retinal adaptation, &c.

Other notable contributions to visual theory are: (1) the molecular dissociation theory of Mrs. Ladd-Franklin; (2) the visual purple theory of Ebbinghaus; (3) the hypotheses added to the Young-Helmholtz theory by König; (4) the reconstitution of the Helmholtz theory by von Kries; (5) the periodicity or gradation theory of Wundt; (6) the hypotheses of Göller, Donders, &c. (E.B.T.)

The first demand to be made upon a colour-theory is that it should posit some (otherwise known) physical or physiological process to account for the most extraordinary fact of colour-vision, that on mixing physically certain colour pairs in certain proportions, the colours disappear, and a grey sensation takes their place; if this is not done, a theory is hardly deserving of the name. In the theories of Wundt and of Ebbinghaus there is no explanation given of this cardinal fact—complementary colour-processes are merely said to have 'something antagonistic' about them. The theory of Wundt, moreover, takes no acount of the fundamental psychological fact of colour-vision, that we can distinguish between the intermediate elements of a colour-series which is constantly changing in the same direction—green, the blue-greens, the green-blues, blue—and the end members of such a series. The theory of Ebbinghaus is based upon views in regard to the nature of the pigment of the rods (the visual purple and the visual blue) which were rendered impossible by our knowledge of the function of that pigment as made out immediately after the theory was proposed. The theory of König is very different from the others. He believes that the cones have nothing to do directly with the luminous sensation, but that they are catoptric instruments for the purpose of condensing light upon the cells of the pigment epithelium, where the photo-chemical processes take place

which are the sources of the sensations of red, yellow, and green. The blue sensation is furnished exclusively by the visual yellow of the rods, and the sensation of a faint light (and that of the totally colour-blind) is also blue in quality, and is due to the visual purple; hence the fovea, where there is no visual purple, is blind to blue ('Ueber den menschlichen Sehpurpur und seine Bedeutung für das Sehen,' *Sitzber. Akad. Wiss. Berlin*, 1894). The blue-blindness of the fovea has not been confirmed by other observers; it is difficult to think that the cones can be condensing-glasses, and at the same time contain fibres of the optic nerve, but that they would have to do in order that the effect of photo-chemical processes taking place in the pigment epithelium might be communicated to the brain; rods and cones are so absolutely alike in structure (except for their basilar terminations, Plate I, Fig. 6) that it is unnatural to assign to them such unlike functions.

v. Kries is apparently in the anomalous position of believing that grey, when furnished by the cones, is a mental reconstitution out of the even red-green-blue sensations, but that, when furnished by the rods, it has its source in some distinctive physiological process.

Donders has a double theory—three-colour (with three different cones, to save the doctrine of specific energy) in the retina, and four-colour, with partial dissociation-processes, in the cortex. In his theory (as in Hering's) red and green are complementary colours, which is contrary to fact: green has for its complementary purple, and the complementary of red is peacock, or blue-green; red and green mixed together make, not white, but yellow. The followers of Hering are able to think of red and green as complementaries only by choosing a very bluish red (purple) or a very bluish green (a full blue-green in fact) as the elementary colours; but this is to give up at once the beautiful reliance upon our power to distinguish, by immediate introspection, between a 'mixed' and a 'non-mixed' colour, which it is Hering's great service to have brought about.

The theory of Göller is one of great interest on account of the fact that in it a conception has been devised by means of which the process which underlies colour may be regarded as an epiphenomenon, so to speak, i.e. as something superimposed upon an achromatic light-process; the theory makes use of the known highly refractive quality of the end member of a visual element, and of the existence of a peculiar transparent thin plate just in front of it, to account for light becoming circularly polarized within the cones; the amount of disturbance corresponds then to degree of luminosity, and the plane of polarization to the colour. It is an impossible theory, because it requires us to suppose that molecular disturbances polarized in different planes can be propagated as such along the nerve-fibres; but the conception of colour as an *aspect* of a non-specific light sensation is not bad. It is, in fact, just what is needed by Hering to enable him to regard all the brightness of a colour as due to its black-white constituent, and as wholly uninfluenced by the presence of the colour-character (his idea of the specific brightening power of the colours was introduced to account for the Purkinje phenomenon, and is no longer necessary since that is known to be merely incidental to the oncoming of adaptation to a faint light: Tschermak); his own view, however, that chemical changes are going on in colour-substances which are of an exactly similar nature to those which take place in the black-white substance, and that they nevertheless contribute *nothing* to the total volume of the sensation, is very improbable.

The main objection to the theory of Thomas Young, an objection which is insuperable, and which lies upon the threshold, is that it takes no account of the fact, patent to the most cursory observation, that, while a mixture of the *causes* of red, green, and blue is sufficient to occasion the sensation grey, grey is nevertheless not a red-green-blue sensation. The theory is good, inasmuch as it reduces the innumerable physiological colour-processes supposed to exist in the visual organ by Newton to a small number: it accounts admirably, for instance, for the fact that all the successive homogeneous light-rays between λ 505 and λ 470 furnish *no new sense-quality*, but only a series of blue-greens gradually varying in the relative amount of each constituent sensation: this is just the sort of theory that the psychologist demands—the physiological conception offered mirrors correctly the deliverances of consciousness. And the same thing holds for the bluish-reds and the reddish-blues. But when we are asked to admit that in the third side of the colour-triangle the case is still the same, that what we call greenish-yellows and reddish-yellows are in reality, in this same sense, greenish-reds or reddish-greens, consciousness rebels;

and still more when we are required to think that, under whatever circumstances we sense grey, and even when we can get no *colour*-sense at all (e. g. in the wholly achromatic sensation of a faint light, and that of the totally colour-blind), we are really sensing red and green and blue without knowing it, and making, for no assignable reason, a totally different mental concept out of the congeries of colours felt together, the idea is so bizarre that it would seem as if to mention it were enough to show its inadequacy. The theory is a purely physical theory; so long as observers fastened their attention solely upon the *physics* of colour-mixing, it could play the rôle of a colour-sensation theory. For the physicist, the series, cold, less cold, indifferent, warm, hot, is also a continuous series, pictured in the gradual ascent of mercury in a thermometric tube; and so much did physics impose, until quite recently, upon psychology, that it required a distinct effort of discovery to establish the fact that heat is a sensation-*quale* wholly distinct from cold (and, by way of sure confirmation of the fact, found to be communicated to the cortex by a distinct conduction-path).

What is meant by those who insist upon it that there are four (not three) unitary colour-sensations, and that all other hues besides those four are of the nature of colour-blends, is well set forth by G. E. Müller (*Zeitsch. f. Psychol.*, x and xiv) in a discussion of the different sorts of quality-series. It is evident that we are capable of distinguishing whether a sensation which goes through a series of changes before our eyes is changing *in a constant direction* or not. Thus if we look at a red revolving disk, and an assistant (without stopping the wheel) puts in constantly a greater and greater proportion of blue, the series of sensations which we get is a very different thing from what it is if he suddenly begins to add yellow—in the first case the series is varying in a constant sense or direction, in the other there is a sudden change in sense or direction. Now if we look through the whole circular gamut of colour-hues (the spectral colours completed by the lacking tones from red to blue) we find that it is not composed of a *single* series of this sort, but of several, interrupted by sharply marked points of breaking. As we approach the wave-length λ 505 on one side, the sensation is getting less and less yellow in character and more and more green (this is a variation of a constant sort), but the moment we pass that point there is a distinct change in the character of the series—its successive elements get to look *less* and *less* like green, and more and more like something quite new, namely, blue. The colour-gamut, which is physically, like the tone-gamut, *rectilinear* (that is, consisting of a series of elements which differ one from another always in the same way, viz. by a constantly accelerating velocity of vibration), is, *for sensation*, not at all a rectilinear series (as is the series of subjective tones), but a series made up of several different stretches, with distinct inflections between them. This is not so well seen in the spectrum, where one of the stretches is partly wanting (the purples), and where differences in brightness are excessive; but if one takes a complete series of colour-hues in paper or in gelatine sheets (all equally bright and equally saturated), and arranges them upon the circumference of a circle, it will be impossible not to see that the series does not

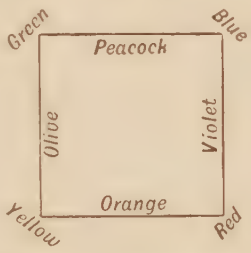


Fig. 10. The psychological colour-square.

vary *in the same way* throughout the scale (as two tones have the same *sort* of difference between each other, viz. that of higher or lower pitch, no matter from what part of the scale they are taken), but that there are distinct *breaks* in the series. If such a series were to be represented in a diagram, that could not be fittingly done by a circle—a curve of constant curvature; we should have to use a figure with sharp angles in it, and, since the number of constituent stretches as well as the number of breaks is four, the proper figure is a square (Fig. 10). On one line of the colour-square, adjacent colours differ in respect to their relative blueness and redness; on another, with respect to their relative yellowness and greenness; it is as if, in one part of the tone-scale, two adjacent notes differed in respect of pitch, and in another part in respect of some other quality not the same as pitch. This is the way the colour-scale represented itself to the ancients, to Leonardo da Vinci, and to Goethe, and it was

only after Newton's discovery of the phenomena of colour-mixture that this fundamental property of the colour-series became completely lost sight of. The psychologists (those who study the exact deliverances of consciousness) owe a great debt of gratitude to Hering for having restored to introspection its proper importance; since his discussion of this question, it has been impossible for any one except a person who attends solely to the physics of light to accept a three-colour theory, or one in which white is regarded as a mental construction out of any number of colours.

It was pointed out distinctly by Leonardo da Vinci that the colours red, green, yellow, and blue differ *in kind* from such colours as orange, violet, &c. Their important character is evidenced by the antiquity of their names; these are so old, in many languages, as to have lost their original signification, while the intermediate hues, violet, orange, are still called by the plain names of the flower and the fruit which stand for them; and, strange to say, we have hardly got any (commonly accepted) names for the other intermediate colour-hues, blue-green and yellow-green. (They might appropriately be called peacock and olive; the latter in its ordinary sense is rather too dark and too greenish for the midway colour between green and yellow, but there is no harm in changing its signification a little for scientific purposes.)

The theory of Hering was accordingly a splendid advance upon the theory of Young; it formed a good resting-place in the history of colour-theory.

But, on the other hand, the theory of Hering fails to take sufficient account of the facts regarding the mixing of colour, in their present complexity [1]. These facts are represented diagrammatically not only in the colour-curves, but also in the colour-triangle (Figs. 11, 14). The latter is a surface, and not, like the musical scale, a line (even a broken line is not sufficient), because it represents two modes of variation, hue and saturation (intensity may be represented also by extending the triangle into a solid body), and it is triangular because the assumption of three elements of mixture (or independent variables) is sufficient to produce all the colour-tones in nearly spectral purity. This is all that the colour-triangle represented in its original arbitrary form; the hypothetical colour-elements could be placed at the vertices of the least enclosing triangle (Fig. 11), or at any other points that were, for any reason, desirable. Some writers even suppose, apparently, that nothing is represented in the colour-triangle except the complementariness of the colours at the opposite ends of a line. Much more than this is represented by the colour-triangle of König at the present time.

For the mixing of colours, no method is of any scientific value in which there is not provision for the extremely accurate measuring of the wave-length and the intensity of several homogeneous constituents. By far the best method is that made use of in the (very expensive) colour-mixing apparatus of Helmholtz (made by Hänsch and Schmidt, Berlin: for description see the *Physiol. Optik*, p. 335). This is, in effect, a double spectroscope;

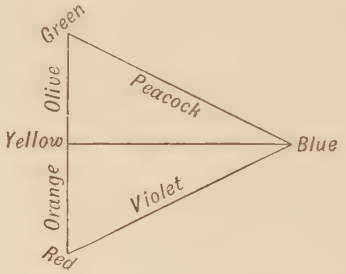


Fig. 11. The physical colour-triangle, with indication of the primary character of yellow and blue.

there are two collimator-tubes which throw light, after it has passed through a prism, into the two halves of a single telescope. The eye-piece of the telescope has been removed, and a plate carrying a narrow slit put in its place; the effect of this is that an eye looking through the telescope sees, not a narrow image of the collimator-slit, but the whole surface of the prism lighted up by homogeneous light. Each collimator-tube carries a double refracting prism of calcspar, so corrected by a prism of glass that each ray is undeviated in its course, and therefore still parallel with the axis of the tube. The two rays are the same as if they came from two images of the collimator-slit separated from each other by an amount depending upon the distance from it of the prism-pair; as that is changed, any ray of the spectrum can be brought into coincidence with any other, and since the rays are polarized in directions at right angles to each other, either ray can, by means of a Nicol prism also inserted in the

[1] For a good account of the physiological objections to the Hering theory, see Thomson in Norris and Oliver's *System of Diseases of the Eye*, i (1900).

tube, be modified in intensity at pleasure. The telescope faces symmetrically one edge of the main prism, and hence there is exhibited to the eye a field of view of conveniently large size, lighted up in the left-hand half by the combination of any two colours taken from the spectrum furnished by the right-hand collimator-tube, each present in any desired intensity, and in the right-hand half the same thing from the other collimator-tube, or, at pleasure, a single spectral colour, or white light. It will be seen at once that this apparatus offers facilities for making colour-mixtures with which no other method can be compared. (It is only from the laboratories of König and of v. Kries that investigations made with the aid of this apparatus have as yet issued [1].)

If one-half of the field of view of this apparatus is filled with a combination of two different lights, and the other half with a homogeneous light, or a different light mixture, or white light, and if the proportions and the character of the several constituents are varied until the two half-fields are indistinguishable, we are said to have before us a colour-equation. The colour-triangle is the diagrammatic record of the results of a vast number of such colour-equations. But it was only after the incorporation into it of the results of equations made by the colour-blind that it acquired its present importance.

It readily suggested itself that the different qualities of the sensation of light, being two-dimensional continua (abstraction being made of intensity), may be represented by the points of a plane. For the simpler forms of vision a smaller number of dimensions is sufficient. The totally colour-blind person has one sensation only (grey) in different degrees of brightness; a single point is sufficient for the representation of his sensation-scale. The partially colour-blind see two colours only, yellow and blue; these are for them the colours of the two halves of the solar spectrum; they are seen in full saturation up to wave-length 630 $\mu\mu$ in the yellow, and beyond wave-length 475 $\mu\mu$ in the blue. All spectrum effects between these two points exhibit a constant variation in saturation up to white itself, and all such spectral effects can be matched by proper mixtures of the saturated end colours, yellow and blue. For these defectives, colour-mixture produces no new hue, but merely changes in saturation; their sensation-scale can be represented upon a straight line (Fig. 11 *a*),

Fig. 11 *a*. (See the text.)

in which the co-ordinates of any point x will be 9 : 1 if the (unsaturated) colour which it represents can be got by mixing yellow and blue in the proportion one to nine, or white and blue in the proportion one to four, and this will serve to fix the position of the spectral colour which this mixture matches. (The wave-length which corresponds to the colourless sensation, W, is different for the two sorts of colour-defectives, proteranopes and deuteranopes; and it is also a little irregular on account of different amounts of absorbing matter in the yellow spot of the eye, if central vision is made use of.) There is another way of representing colour-quality diagrammatically, which runs parallel to this one, and in which the amounts of blue and yellow to be mixed are represented by the ordinates of two curves, the abscissae being the wave-lengths. The curves marked W_1 and W_2 in Fig. 12 *b* show the relative amounts of the two end-constituents which must be mixed together in order to match the continuous spectrum for each of these two classes of colour-defectives.

We come now to cases of normal vision. For such individuals it is not possible to match the whole series of spectral colours by means of the two end colours only. The ends of the spectrum are here, as before, for some distance, of unvarying hue, and differ in intensity only—the warm end up to 655 $\mu\mu$ and the cold end beyond 430 $\mu\mu$. Outside of these regions the spectral colours cannot be matched by the end colours, either alone or together, but it is necessary to take in a third constituent. This third constituent is in the first place chosen somewhat at hazard. (No single third constituent will give the spectral colours in full saturation, and hence a somewhat more saturated green than any in the spectrum is hypothetically taken as the third element of the sensation area.) With these arbitrarily chosen independent variables the

[1] For the production of somewhat nearly homogeneous light by means of gelatine plates, see Kirschmann, *Philos. Stud.*, vii. 543, and Hellpach, *Philos. Stud.*, xv. 527 (1900); for the liquids to be used for the same purpose, Nagel, 'Über farbige Strahlenfilter,' *Biol. Centralbl.*, 1899. Yellow cannot be got with gelatine plates, and for them must be substituted some fluid filter, e. g. one composed of a cell of potassium dichromate together with one of uranium sulphate.

colour-curves are laid down (Fig. 12 *a*): it is found that they do not coincide exactly with the curves of the two sorts of dichromates, the so-called red-blind and green-blind (Fig. 12 *b*). But would they have coincided if *different* independent variables had been chosen? The question is easily put to the test: it is a simple matter of mathematics (merely a

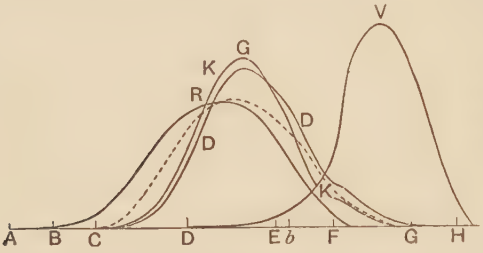


Fig. 12 *a*. The proportions of the three trial elementary colours required to match all the colours of the spectrum, for normal individuals.

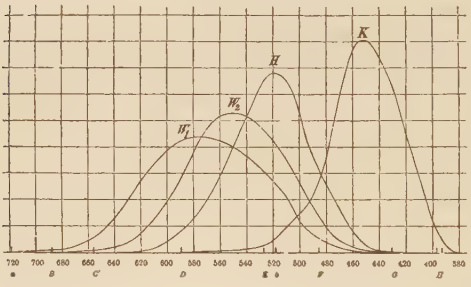


Fig. 12 *b*. W_1, K, curves of sensation for two green-blind; W_2, K, those for two red-blind individuals; H, curve showing the intensity of the grey sensation for the totally colour-blind. (König.)

change in the triangle of reference) to find out if there are independent variables, that is, unit quantities of lights of particular wavelengths, such that the entire spectrum as seen by the three different classes of individuals can be built up out of like amounts of two or three of the several constituents. In fact, it was only necessary to substitute for the colours first chosen others mixed out of them in this way,

$$\mathfrak{R} = \frac{R - 0{\cdot}15G + 0{\cdot}1B}{0{\cdot}95},$$

$$\mathfrak{G} = \frac{0{\cdot}25B + G}{1{\cdot}25},$$

$$\mathfrak{B} = B,$$

to find that, with these new constituents, the warm-end curve of one sort of defective coincided with the red curve, and that of the other sort of defective with the green curve of the normal individual. In Fig. 12 *a* are represented the trial curves for König and Dieterici; in Fig. 13 the curves of coincidence for normal and semi-defective individuals. (In the dotted line of Fig. 12 *a* is given the green curve of a very small class of individuals, first noticed by Lord Rayleigh and by Donders, who differ markedly from the normal; they require, to make a given yellow out of red and green, four times as much red to a given amount of green as the normal individual does.) Expressed in other words, this is the same as saying that all colour-matches formed by normal individuals

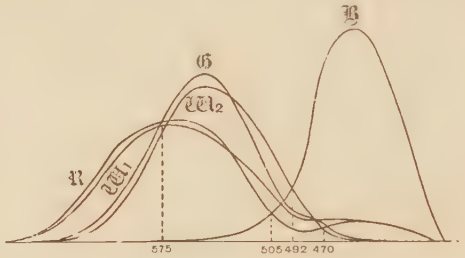


Fig. 13. When λ 470 (blue), λ 505 (green), and a red a little less yellowish than the red of the spectrum are taken as the elementary colours, the colour-mixture curves of the normal individual become coincident respectively with those of the two sorts of partially colour-blind.

are recognized to be such by both sorts of dichromates [1], but that colour-matches formed by the proteranope need to be distinctly changed before they are such for the deuteranope. This means that the colour-systems of both sorts of dichromates are reduction-systems—all their sensations are accounted for by supposing that one certain element (not the same for both) is absent in their case. This is a very important result. It has quite lately been fully confirmed by v. Kries ('Ueber Farbensysteme,' *Zeitsch. f. Psychol.*, xix, 1897). The theory of Hering fails to take account in any adequate way of the fact that the dichromates are of two different sorts, and that nevertheless their colour-systems are both simply reduction-systems of normal colour-vision. On the other hand, the Young-Helmholtz theory offers no explanation, of any degree of reasonableness, of the fact that the two classes of semi-defectives, instead of seeing red and blue, and green and blue, respec-

[1] The converse of this proposition is, of course, not true: countless things which look alike to the semi-defective are of different colour to the normal eye.

tively (if they had done this matters would have been very simple), see, as matter of fact, in both cases, *yellow* and blue. This is proved beyond question by the cases of uniocular partial colour-blindness known since 1881; it was also perfectly well established, in 1874, by William Pole (the well-known authority on whist), by means of very acute observations upon himself, a semi-defective. Sir John Herschel, unconvinced by Pole, said, 'What the sensations of the colour-blind really are, we shall never know,' quite overlooking the possibility of cases arising in which the defect should be in one eye only. The theory of Helmholtz has imposed itself upon writers on this subject to such an extent that even now it is hard to convince them that these defectives are not 'green-blind' or 'red-blind'

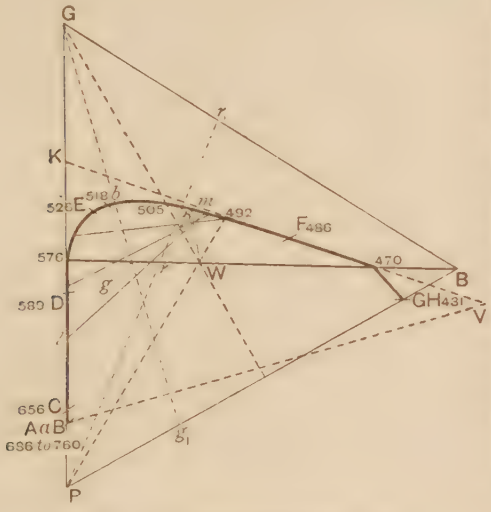


Fig. 14. (For description see text.)

alone (they always neglect to mention what becomes of yellow). The report of the British Association Committee on colour-vision, so late as 1892, contains coloured spectrum plates showing the spectrum in green and blue and in red and blue, as it is supposed to be seen by these defectives, and Abney prefixes the same plate to his Tyndall Lectures on colour-vision published in 1894.

In its present form the colour-triangle constitutes a *vade mecum* for holding together for the eye a number of the facts of vision. (See Fig. 14.)

(*a*) Complementary colours are to be found at opposite ends of lines through the central point, *W*.

(*b*) The degree of whiteness of any non-spectral colour corresponds to its nearness to the point *W*.

(*c*) Any non-spectral colour may be made up out of spectral lights situated at the ends of any line drawn through the point which represents it, mixed in the inverse proportion of the corresponding segments of the line, as indicated by the several lines drawn through *p* in the figure.

(*d*) The proportion of the 'elementary' constituents in any colour, spectral or not, may be got by dropping perpendiculars from its position upon the sides of the triangle; the perpendicular upon *BG* will give the amount of red, &c. (This is merely saying that we have here a representation of continuous quantities in terms of trilinear co-ordinates.)

(*e*) All the colours which for the normal individual lie on a straight line through *R*, as *Rr*, look exactly alike to the 'red-blind,' and are represented for him by the point in which that line cuts the line *By*. The reason for this is that the perpendiculars from any point of such a line *Rr* upon the two sides of the triangle, *RB* and *RG*, are in a constant ratio to each other; that is, points of such a line represent colours which contain the blue and the green elements in a constant proportion, and as they also contain no red, they are indistinguishable from each other. In particular, the point in which the line *Rr* cuts the curve of the spectral colours will give the wave-length which is represented at the point *r*. The same holds for the 'green-blind' and lines through *G*.

(*f*) It is commonly said in the textbooks that in the mixing of coloured lights 'the nearer the homogeneous lights are to one another the more vivid or more saturated is the intermediate colour' (Külpe); this was a good first approximation to the true state of the case, and the colour surface was properly represented at first by a circle. But it is far from being correct. All spectral lights on either of the two nearly straight portions of the colour-curve can be matched, *with no loss of saturation*, by the lights at the ends of these stretches, although they are far apart. (This has lately been expressly reaffirmed by v. Kries.) On the other hand, colours taken from *different* stretches, when mixed, show rapid falling off in saturation. All this is plainly represented in the shape of the triangle: it is composed of two rectilinear stretches (λ 760 to λ 576 and λ 492 to λ 470) connected by a portion of rapid curvature.

The theory of Hering (which was first sketched out by Mach in 1865) is so vastly superior to the Young-Helmholtz theory, that until it has fully displaced that it is hardly desirable to discuss its demerits. Nothing is gained for the theory by saying that opposite colour-processes are due to assimilation and dissimilation of photochemical substances; the theory would be just as good (and less open to objection) if the nature of the antagonism in the chemical processes were left obscure—if they were said to have 'etwas antagonistisches' about them. There would then be no occasion for saying that the black and white processes have anything antagonistic about them; the sensations do not, as matter of fact, extinguish each other, like blue and yellow—they form a quality-blend, like blue and green; that is to say, the distinctive sensation-*quale* of each does not disappear, they both remain in the constantly varying series of the greys.

Hering has done a great service in showing that a large number of the phenomena of vision are physiological, and not of the nature of mental errors, but it is too much the custom of his school to consider that a phenomenon has been explained by the theory when it has merely been translated into the terms of the theory. Thus when a patch of colour falls upon a bit of the retina, the sensation which it gives is accompanied by a sensation of the opposite colour-character furnished by the immediately adjoining portion of the retina. This Hering explains by saying that, if the original colour is caused by an assimilation process, the effect of this is to start up a dissimilation process in the adjoining region of the retina, and if it is a dissimilation process, it arouses an assimilation process there; but this is nothing more than to say (once it is admitted that the simultaneously induced colour is retinal) that one process of a colour pair has a tendency, in the interest of a restoration of retinal balance, to start up all around it the opposite process; nothing whatever is added to the intelligibility of the reaction by assuming that it is alternately assimilation and dissimilation. That is to say, there is no special *reasonableness*, derived from our knowledge of the nature of these processes elsewhere, in a patch of growth of a chemical substance in the retina becoming immediately surrounded by a region of decay, or in a patch of decay enclosing itself in a region of growth. It is none the less a matter of great importance that Hering has shown by a large number of simple and ingenious experiments that the phenomena of the after-image and simultaneous light and colour induction are physiological in their character, and not of the nature of illusions of judgment. To take an instance: if, while a constant fixation-point is maintained, a number of different coloured objects be introduced at different times upon a common grey background, each will be seen to go through with its own series of after-effects and border-effects exactly as if the others were not present. So complicated a series of disjunct but simultaneous acts of judgment as would be involved in carrying out all these changes, different in period as well as in character, is quite inconceivable. There is no doubt that Helmholtz was wrong in attributing these colour and brightness effects to errors of judgment to the extent that he did; but it is also a great mistake to suppose that there is anything in an assimilation-dissimilation theory that is peculiarly fitted to explain them.

The objection to the Hering theory, that black and white are attached to antagonistic processes, is one that he could easily remove if he saw occasion for it; he would merely need to assume that those sensations are attached to photochemical processes in different substances, or that, for instance, white is retinal and black a mark of the resting-stage in the cortical portion of the total light-process. But the fact that it must regard red and green as a colour pair which, when combined, result in white, is fatal to his theory; it is the most elementary fact of colour-mixing that real red and green make yellow. Red and green are made a vanishing colour pair in this theory only by choosing as fundamental colours (Grundfarben) tones which are in fact distinctly blue-green and blue-red.

The two rival theories, therefore, are able both to continue to exist only by means of the fact that each is content to totally ignore the central facts of nature upon which the other is built up. The Helmholtz theory has no word to say to the fact that yellow, made up of red and green, is *yellow*, and not reddish-green, and that white is *white*, and not a reddish-greenish-blue. The Hering theory exists in complete oblivion of all the facts of colour-mixture—the facts which, in the laboratory of the physicist, are almost exclusively the ones that come within his ken. It is small wonder that the same dividing

line separates the adherents of the two theories and the adherents of the physical and of the physiologico-psychological sciences.

Again, neither of the two reigning theories pays any attention to the fact that the luminous function has probably undergone, like other functions of the body, progressive development [1]. But the structure of the retina points already strongly to this view. It has lately been put beyond question (Ramon y Cajal) that the rods and cones represent not simply accidental variations in the shape of elements that are in reality of similar character, but that they are fundamentally different, and in fact that the cones (which, in an early stage of development, are exactly like the rods) are differentiated out of the rods in the direction of a higher structural development. It is not the cone shape that is their distinguishing mark, however—the closely pressed together cones of the fovea do not differ in shape from rods. In internal structure of their outer members (the falling apart into plates or disks), in their highly refractive character, in the possession of a fine covering-substance, in the presence of a thin plate between outer and inner member, the rods and the cones are exactly alike; but they differ markedly in the endings of the cell-fibre (see Fig. 6). The rods terminate in a minute expansion, or end-knob, which is grasped by the arborizations of the contiguous bipolar cells; the cones end in a more complicated structure—an expansion of finger-like processes which enter severally into connection with different bipolar processes. This distinctive structure appears late in the development of each cone, and is hence certainly late in phylogenetic development. It points to a provision for a less simple sort of excitation conduction than that of the rods. (It appears from this that the rods and cones have not been named from their most distinguishing characteristic—they should rather be thought of respectively as the *knob-end* and *finger-end* retinal elements.) The structure alone, therefore, of the visual organ is enough (since the brilliant anatomical researches of Ramon y Cajal have been accessible) to make it plain that we have in the visual sense an instance of progressive development.

But our knowledge of visual function leads conclusively to the same view. The visual process is not everywhere so complete as it seems to us to be in everyday life, when we make use chiefly of the portion of the retina near the centre, and take peripheral stimulations merely as affording us a hint of what we are to look at next. If central vision is cut off, and we look at coloured surfaces with the extreme periphery of the eye, we perceive that their colour is no longer distinguishable—that all objects appear only in various shades of grey [1]. As images fall upon retinal regions somewhat nearer the centre, yellows and blues begin to be perceived, but reds and greens are still seen only as greys, in as far as they are of purely fundamental tone; if they contain admixtures of blue or yellow light, this latter light is seen, but without any reddish or greenish tone. This zone of exclusive yellow-blue vision may be called the mid-periphery. (Its existence is affirmed by Hess, v. Kries, and others, and denied by Kirschmann.) Within this is the region of complete colour-vision, where all colours appear in their normal value. The boundaries of these regions would be somewhat differently laid down according to the size and the brightness of the test objects chosen, and to the time of their exposure [2].

These several capabilities of vision, according to the portion of the retina which mediates it, can only be regarded as different degrees of development of the sense of sight. Exactly corresponding to these retinal regions of the normal eye are the most frequent cases of

[1] In the ear we have an organ for perceiving the sense-quality attached to difference of vibration-periods (pitch), and persisting side by side with it an organ for noise only.

[1] Hellpach claims to have shown (*Philos. Stud.*, 1900) that in the ultra-extreme periphery, colour-vision is possible—that it is not there overlaid by the excessive white-contribution of the rods as it is just within. This would be, however, confirmation of the theory, for in that region there are cones in the retina, and no rods (Greef).

[2] The space-sense of the retina is also incomplete in this external region: a circle half white and half black on a grey background, if brought into the extreme edge of the field of view, can be seen to be composed of black and white when the relative position of the two half-circles cannot be at all distinguished. Also, a certain duration of exposure is essential to correct space-perception: if that is not sufficient, very different space-relations will be given from the actual ones (the physiological diffusion-circle: Exner, *Pflüger's Arch.*, 1898; Cattell, *Psychol. Rev.*, July, 1900). This is not strange, because it is a law of photochemistry that the amount of effect produced is proportioned not only to the intensity of the light, but also to its duration, and that intensity and duration can exactly replace each other (Ostwald). It is natural, therefore, that a stimulus which produces an insufficient amount of retinal excitation (whether from too short duration, too small extent, or too weak intensity) should fail to give sufficient material to the space-perceiving centres to enable them to work correctly.

defective colour-vision. Ordinary partial colour-blindness consists of vision for yellow and blue only (xanthokyanopia) and total lack of sensation for red and green. (It is still persistently said that these defectives 'fail to distinguish' red and green; they fail to *distinguish* them because they are totally blind to both; they see in their stead various more or less whitish yellows—see Norris and Oliver, *System of Diseases of the Eye*, Plate facing title-page. And though they are comparatively rare, the cases are perfectly well marked, and have now been thoroughly well examined, of those individuals who see no colour whatever—to whom the world is like a picture in various tones of grey.)

The molecular dissociation theory (theory of the differentiated chemical substances)[1] was devised with the intention of hitting upon a conception which should render intelligible *both* the facts of colour-mixture and all the psychological phenomena which the Hering school has done such good service in bringing to the fore, and which should at the same time take account of the probability which is now thrust upon us, that colour is phylogenetically a late acquisition—that the primitive sense was for the achromatic luminous quality only. If the retinal basis of the light-sense is a photochemical process (as is suggested by the known presence in the rods of a substance extremely sensitive to light), then this would mean that the eye which furnishes the colour-sense contains more complicated chemical substances than do the retinae which are defective—or, if the cones only furnish colour-sensations, that the cones contain more complicated chemical substances than the rods; at the same time the total effect of complementary colour pairs in the cones must be the same as in the rods, for we see whites in the fovea (where there are cones only) which are indistinguishable from the whites of the rods. It would be a difference of an adequate sort, therefore, if there were a chemical substance which in the cones underwent partial dissociation under the influence of light, and differently for the different regions of the spectrum, but which in the rods became completely dissociated at once, and alike for all sorts of light. It happens that there is immediate analogy for this conception of a photochemical substance which is, in primitive condition, dissociated at once, but, in more highly developed animals, dissociated in successive stages: the rod-pigment, which exists first in the form of the visual purple, is turned at once into the visual white in animals below man; in man alone it passes through an intermediate stage, the visual yellow (Köttgen and Abelsdorff). A change of this sort, from a substance which is decomposed all at once (in the rods) to a substance which is decomposed in successive stages (in the cones), is just what it is sufficient to assume to account for the fact that from the rods we have colourless vision only, and from the cones distinction of colour, but such that there results, in the end, the same achromatic sensation in both[1].

Corresponding, therefore, to the successively developed powers of the retina for light-discriminations, this theory assumes a chemical substance which is, in the first instance, completely dissociated by light of all kinds (achromatic vision); then (owing to different synchronous intramolecular vibrations—in no other way can selective dissociation by light be conceived to take place: Ostwald) differently dissociated by the two halves of the spectrum (yellow-blue vision); and, finally, susceptible of partial dissociation in three different ways, but with the peculiarity that out of the products of the red and the green dissociation there is reconstituted at once the excitant of the sensation of yellow light[2]. The actual molecule of such a photo-

[1] *Zeitsch. f. Psychol.*, iv. 211 (1892).

[1] The existence of this analogy in the rods for a change in the character of a photochemical substance in the cones was not, however, known at the time this theory was proposed. The fact (for such it seems to be, although it has not been explained yet how other observers failed to notice it) was announced in 1895.

[2] The essential elements of this theory have been stated as follows by Dr. Bowditch: 'A colour-theory which is in some respects more in harmony with recent observations in the physiology of vision has been proposed by C. Ladd-Franklin. In this theory it is supposed that in its earlier periods of development, the eye is sensitive only to luminosity and not to colour—that is, it possesses only a white-black or (to use a single word) grey-perceiving substance, which is affected by all visible light-rays, but most powerfully by those lying near the middle of the spectrum. The sensation of grey is supposed to be dependent upon the chemical stimulation of the optic nerve terminations by some product of decomposition of this substance. In the course of development a portion of this grey visual substance becomes differentiated into three different substances, each of which is affected by rays of light corresponding to one of the three fundamental colours of the spectrum, viz. red, green, and blue. When a ray of light intermediate between two of the fundamental colours falls upon the retina, the visual substances corresponding to these two colours will be affected to a degree pro-

chemical substance is certainly extremely complicated, but a molecule of complexity sufficient for the purposes of the theory is represented in the diagram (Fig. 15), which should be compared with Fig. 11 *a*.

Literature (to VI and VII): Leonardo da Vinci, Trattato della pittura (1519); I. Newton, Optica, Lib. I., P. II., Prop. iv–vi; J. H. Lambert, Beschreibung einer Farbenpyramide (Berlin, 1772); Wünsch, Versuche u. Beobachtungen über die Farben des Lichtes, Gilbert's Ann., xxxiv. 10 (1792); Th. Young, Lects. on Nat. Philos. (London, 1807); and Physiol. Optik (2nd ed., 1896); H. Grassmann, Zur Theorie der Farbenmischung, Pogg. Ann., lxxxix. 69; Philos. Mag. (4). vii. 254; J. C. Maxwell, Experiments on Colours perceived by the Eye, with Remarks on Colour-blindness, Trans. Roy. Soc. Edinburgh, xxi. 275; Hering, Zur Lehre vom Lichtsinne (1874, and later); G. E. Müller, Ebbinghaus, von Kries, and Mrs. Ladd-Franklin, in the Zeitsch. f. Psychol.; König, in Sitzber. Acad. Wiss. Berlin (1894); Wundt, Philos. Stud., iv. 311. (C.L.F.–E.B.T.)

VIII. Achromatic Vision. Under several

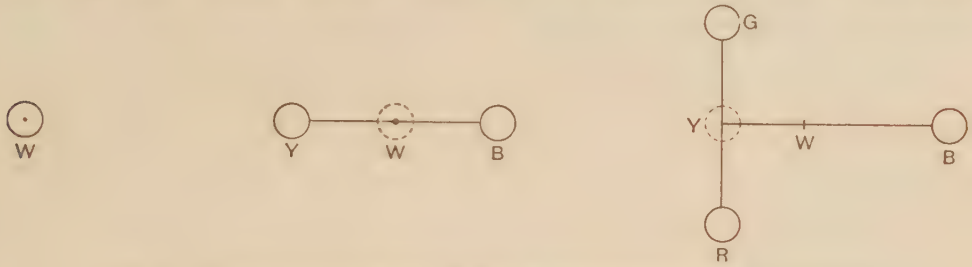


Fig. 15. The colour molecule (hypothetical) in three successive stages of development.

J. W. Goethe, Zur Farbenlehre, i. § 103; H. Helmholtz, Ueber die Theorie der zusammengesetzten Farben, Müller's Arch. f. Anat. u. Physiol. (1852), 461; Pogg. Ann., xxvii. 45; Philos. Mag., 1852 (4), iv. 519;

portionate to the proximity of these two colours to that of the incident ray. Since this effect is exactly the same as that which is produced when the retina is acted upon simultaneously by light of two fundamental colours, we are incapable of distinguishing in sensation between an intermediate wave-length and a mixture in proper amount of two fundamental wave-lengths. When the retina is affected by two or more rays of such wave-lengths that all three of the colour visual substances are equally affected, the resulting decomposition will be the same as that produced by the stimulation of the grey visual substance out of which the colour visual substances were differentiated, and the corresponding visual sensation will therefore be that of grey or white. . . . The theory of Mrs. Franklin accounts for these phenomena [colour-blindness] in a still more satisfactory way; for, by supposing that the differentiation of the primary grey visual substance has first led to the formation of a blue and a yellow visual substance, and that the yellow substance has become in turn differentiated into a red and a green substance, colour-blindness is readily explained by supposing that this second differentiation has either not occurred at all or has taken place in an incomplete manner. It will be noticed that the important feature of this theory is that it provides for the independent existence of the grey visual substance, while at the same time the stimulation of this substance is made a necessary result of the mixture of certain colour sensations' (Bowditch, in Howell's *Textbook of Physiol.*, 1st ed., 1894, 784).

different circumstances, vision exists only for shades of grey—the field of view is like an engraving (but in three dimensions) in black and white; these cases are: that of total colour-blindness (congenital or from disease); that of the normal eye in the extreme periphery; and that of the normal eye when the illumination is very faint (night-vision).

The adherents of the Young-Helmholtz theory ignore the existence of white as anything except a product of the reconstructing mind, and hence, in spite of plenty of evidence to the contrary, the sensations of those individuals whom they named 'monochromatic' (in distinction from ordinary vision, which is tetrachromatic, but which was called, under the dominance of the colour-triangle, trichromatic) were dogmatically affirmed to be vision under the form of red or blue or green, it was uncertain which; and the colourless sensations of the periphery and of a faint light, although they are patent to observation, were wholly overlooked. Even so late as 1894 König affirmed that the vision of the faint-light 'monochromates' was in quality blue, in the face of the popular knowledge, 'im Dunkeln sind alle Katzen *grau*.' But as early as 1880 it had been put beyond question by Becker's case of monocular congenital total colour-blindness [1], that the sensation that remains is that of grey;

[1] *Arch. f. Ophthal.*, xxv. (2), 205.

if the patient's vision is normal with one eye it is impossible to doubt that he can describe correctly what he sees with the other. Moreover, the numerous cases of acquired total colour-blindness, which there is no reason for putting wholly out of court, and especially those in which the defect comes on in one eye only, or in a circumscript region of the retina (for instance, in tobacco and alcohol scotomata), had shown conclusively the same thing.

The quality of the sensation-series in all these cases is therefore grey—the different regions of the spectrum differ in luminosity only. Is the relative luminosity of the spectral regions the same as for central vision with the normal eye? In the case of the normal eye, estimations of brightness are difficult on account of the disturbing colour-differences, but by the method of the so-called flicker-photometry (see PHOTOMETRY, heterochrome) they can be made with great accuracy. In 1884 Donders, and in 1889 König and Dieterici, determined the distribution of brightness along the spectrum (what may be called the luminosity-spectrum, just as by absorption-spectrum is meant the relative amount of absorption in different spectral regions) for the totally colour-blind; it was found to be quite different from that for the normal eye, the maximum brightness being in the green instead of in the yellow.

A most important advance in this subject was made in 1889, when it was found by Hering and Hillebrand that the luminosity-spectrum [1] of the normal eye after the Purkinje phenomenon has set in (night-vision, darkness-adaptation) is exactly the same as that for the totally colour-blind at all illuminations [2], and at the same time, of course, very different from that of the normal eye in ordinary light. This is exhibited in Fig. 9 (where the scale on which the several curves are drawn is so chosen that green, λ 535, is taken as alike in all); there is a gradual falling off in the superior brightness of yellow until, at a certain low total luminosity, the maximum is in the green, and at this stage there is complete coincidence between the spectrum of the normal eye and that of the totally colour-blind. This made it look as if Hering's black-white 'valences' had indeed a separate existence, and it spoke strongly against the theory of Helmholtz [1]. It required Hering, however, whereas he had formerly maintained that colour has no effect upon brightness, to set up the theory of the 'specific brightening and darkening powers of the colours' (since given up: vide Tschermak). But the subject was soon afterwards put upon a very different footing by König; he showed that the (objective) absorption-spectrum of the visual purple (that is, the relative amounts of the light of different wave-lengths absorbed by it when it is extracted by gallic acid from a freshly enucleated human eye, and examined immediately, in a dark room, by means of a spectrophotometer) is also coincident with the (subjective) luminosity-spectrum of the totally colour-blind and with that of the normal eye in a faint light (which had been shown, as has just been said, by Hering to be coincident with each other). This forced upon one the conclusion that it was the visual purple that was involved in both of these two sorts of vision, and that that acted proportionately to the amount of light of any given kind that it absorbed. (This is not always the case in instances of photochemical dissociation by heat and light: Ostwald.) It was not shown by this that the visual purple was the photochemical substance of the rods—it might equally well act simply as an absorbent of an additional amount of light, which would otherwise go through the rods and be lost in the pigment epithelium and in the choroid. The fact that it is of a slightly different colour in fishes (and in fishes only), whose darkness is the darkness of ocean depths (and hence of a different colour from that of the depth of the forest), points to absorption as its essential function. Still less was it shown that the *rods* function in the darkness only, as v. Kries supposes; on the contrary, the *change* in the visual purple (regeneration in a faint light) is just what is needed to account for the *changed* values of night-vision. Again, it has been shown by v. Kries

[1] It is desirable to use, for the time, the word luminosity in place of brightness, in order to avoid confusion with the meaning which Hering attaches to the latter word.

[2] 'Ueber d. specifische Helligkeit d. Farben,' *Sitzber. Akad. Wiss. Wien*, 1889.

[1] König admits that this coincidence made him, at first, 'ungemein betroffen,' but he goes on to say: 'aber zur Zeit der Epicykeln-Theorie hat man ja auch Sonnen- und Mondfinsternisse richtig im voraus berechnet' (*Helmholtz-Festschrift*, 354). This is a very acute remark. The ardent adherents of Hering are too much in the habit of protesting that every little coincidence furnishes a complete proof of the whole theory (Müller, *Zeitsch. f. Psychol.*, xiv). This particular one is not a little one, but what it proves is that white (grey) is a definite thing, alike under various circumstances—not that the Hering theory is true.

that the peripheral achromatic vision has a different distribution of brightness in the spectrum—the same, in fact, as that of the (heterochrome) brightness of the centre of the retina; this points to the fact, not that the cones alone function in the periphery (they are too few for that), but that the rod-vision, *when it is not reinforced by the visual purple*, is the same sort of thing, as regards its brightness-values, as vision with the cones.

It had been shown meantime (1892) that Newton's law of colour-mixtures (see X, below) did not hold at low intensities; its persistence under all circumstances had been affirmed by Maxwell, by Aubert, by v. Kries, and most vigorously by Hering. This fact had an important bearing upon the discussion.

In the remarkable case of congenital total colour-blindness of Raehlmann (*Arch. f. Augenh.*, ii, 1899), the distribution of brightness in the spectrum is quite unlike any other that has hitherto been observed: there was an extreme darkening in the part that is normally yellow, and blue was proportionally brighter than for the non-defective individual. But the abnormality in this case is clearly of cerebral origin, as is shown by the fact that foveal vision was retained.

IX. The Separate Function of the Rods and the Cones. Interest in the phenomena of visual sensation has centred of late years in the question of the discrimination of function of rods and cones, and in questions intimately connected with it. It would be singular if organs of such very distinctive structure (knob-like or finger-like connections with the bipolar cells, Fig. 6), and of such very different chemical contents (presence or absence of the rod-pigment), should not play a different rôle in the visual economy. Neither of these objective differences was known at the time when Max Schultze first made the suggestion that the rods constitute an organ for black and white vision only, and that colour is mediated only by the cones (1866); but there was already sufficient ground for his view in the fact that in the retina of many night-animals rods are found exclusively, or nearly so. This view seems to have been very generally overlooked (though it has been better kept in mind by the anatomists: Ramon y Cajal), until Parinaud revived it (1881), being led thereto by the study of hemeralopia (daylight vision—night-blindness), a disease in which the power of seeing things in a very faint light, which the normal person acquires after remaining for twenty minutes or so in darkness (a power which may, correspondingly, be referred to as *night-vision*), is wholly wanting, and in which there is also degeneration of the pigment epithelium, which is known to be the source of the visual purple (rod-pigment). As he pointed out, animals which lack the rod-pigment altogether (doves, chickens) are also night-blind—'se couchent avec les poules.' But this night-vision, which would seem thus to be rod-pigment vision, is a form of achromatic vision—in an extremely faint light all colour disappears, and objects are seen only in shades of grey. Hence it seemed probable that the rods (at least, when they contain the visual purple) are organs for colourless vision only. (Parinaud regarded—and still regards—the vision of a faint light as due to the fluorescence of the visual purple; but that is impossible, for it is most fluorescent when it is in its completely bleached-out condition—the visual white.)

Other arguments were added by Parinaud. In the vision of approaching darkness-adaptation, differently coloured surfaces, before they wholly lose their colour, suffer a change of relative brightness (blues shine out brilliantly in a semi-darkness: the Purkinje phenomenon); but this change does *not* take place if the colours are looked at with the fovea only, and hence (since the fovea is lacking in nothing but rods) it must be a phenomenon dependent upon the rods, and in fact upon the regeneration of their visual purple[1].

[1] This fact—the absence of the change in brightness-values in the fovea (in other words, the failure of the Purkinje phenomenon)—has been warmly contested by several different observers, but the latest work of v. Kries on the subject (*Zeitsch. f. Psychol.*, xxiii. 183, 1900) puts it quite beyond question. He finds the unchanging region to be, for the dichromatic person tested (such individuals are far better adapted to tests of this kind than are others, because many combinations of objectively different spectral lights can be found which look alike to them in colour), for the horizontal direction 1°47′ in one eye and 1°23′ in the other, and for the vertical direction 1°21′ in both eyes. These dimensions are a little less than what Koster finds to be the diameter of the rodless region—2°. But (1) there are, no doubt (as appears from these two eyes of a single person), great individual differences, and (2) a few scattered cones may well exist further in than Koster detected them. The amount of change was very slight until a definite remoter region was reached, and here it suddenly became much greater; this was, no doubt, about the place where the arrangement of one cone surrounded by a circle of rods is established.

It is still Parinaud who first pointed out that it is only the achromatic constituent of the sensation that is affected by this change. In proportion as the blues become relatively brighter, they become also less saturated, and, still more, the greens, as they become bright, become finally wholly uncoloured. The reinforcement occurs, that is to say, not for colour in itself, but only by way of mixing in more white or grey. (This is sufficient, doubtless, to account for the fact that in a very faint spectrum blue is not seen at all; the spectrum looks simply red or green, and this in spite of the fact that the Purkinje phenomenon is usually considered to consist exactly in the brightening of this colour. The blue becomes, in fact, so much overlaid with the white constituent furnished by the rods that it is no longer visible as blue.) Again, this fading out into an achromatic sensation before becoming wholly extinguished —which is what the Purkinje effect really consists in, the change in brightness being an attendant phenomenon—does not occur in the fovea. If a spot of coloured light is so minute as to throw its image upon the fovea only, then, however faint it is, if it is seen at all, it is seen in its true colour, not first by means of its colourless constituent. This has been doubted in the case of blue, but it has been confirmed by König and v. Kries, and recently again by Fick. (The case is less clear for yellow.)

The argument in favour of a difference in function of rods and cones was thus already in the hands of Parinaud exceedingly strong. It happened, however, that it remained completely overlooked, and the several facts noticed by him were rediscovered by other observers—the fact that colours seen with the fovea lack the preliminary achromatic stage of rod-vision by König in 1894 ('Ueber den menschlichen Sehpurpur, &c.,' *Sitzber. Akad. Wiss. Berlin* vom 21. Juni 1894); König did not, however, uphold the theory here in question—he regarded the cones as catoptric instruments, viz. as condensers for throwing light upon the cells of the pigment epithelium, where he supposed all colour processes except that for blue to take place); the normal night-blindness of the fovea—that is, the fact that the extremely faint lights which the rod-adaptation exists for the sake of enabling us to see are wholly invisible in the fovea—and also the total *blindness* in the fovea of some of the congenitally totally colour-blind, a little earlier by Ladd-Franklin (ibid., 589, and *Proc. Amer. Psychol. Assoc.*, 1894); the absence in the fovea of any change in the relative brightness-values of different spectral lights, first made certain by v. Kries in 1900, by means of colour equations, in which each member is made alike in colour, although different in light-ray constitution (*Zeitsch. f. Psychol.*, xxiii). This theory of the probable difference in function of the rods and cones had already been made (1892) the ground-work of the molecular dissociation colour-theory (or theory of the developed photochemical substances: *Zeitsch. f. Psychol.*, iv, 1892); it is so strongly suggested by the fact that night-animals—owls, rats, moles—have retinae almost wholly deficient in cones, but containing rods which are exceedingly rich in the visual purple, that it would have been simply accepted ever since its first proposal by Max Schultze had it not been that it was wholly contradictory to the reigning Young-Helmholtz colour-theory. v. Kries, who is a warm defender of the theory (but in the form that the rods are altogether a 'darkness-apparatus,' and that, although they outnumber the cones twenty to one, they are wholly functionless in an ordinary illumination), apparently holds now to the belief that there are two sorts of white—one physiological and brought about by a photochemical dissociation in the rods, the other psychical and due to a mental reconstitution of an even red-green-blue sensation into a sensation of indistinguishable quality from the first. From the laboratory of v. Kries have issued a number of important investigations which have had for their object the establishment of the disjunction of function of the rods and the cones; to refer to the theory as the v. Kries theory is, however, a mistake[1].

If the rods furnish colourless vision only, is it not possible that the vision of the totally colour-blind is vision solely by the rods? If that were the case, these defectives should be *totally blind* in the fovea, where there are only cones. That was found to be the case in the first instance of the defect which was tested in this regard (*Sitzber. Akad. Wiss. Berlin* vom 21. Juni 1894, 593). A number of cases which have been examined since (Hess, Hering, Pflüger) seem not to have had this defect; but the case of Uhthoff, which was first announced by him to be

[1] And still more so to call it (Abelsdorff) the Schultze-König theory. Aside from the question of priority, the theory of König is not even the same as that of Schultze, either for the cones or for the rods.

without it, has since been found, by more careful methods, to be actually an instance of total foveal blindness. But meantime there has been added to our knowledge of this subject the fact that a patient of Raehlmann's (*Zeitsch. f. Augenh.*, ii, 1899) had, with total colour-blindness, perfect visual acuity, which would not be possible without the functioning of the minute visual elements of the fovea. This case shows, doubtless, what was well known before from cases in which the defect is due to disease, that total colour-blindness may be caused by lesions or

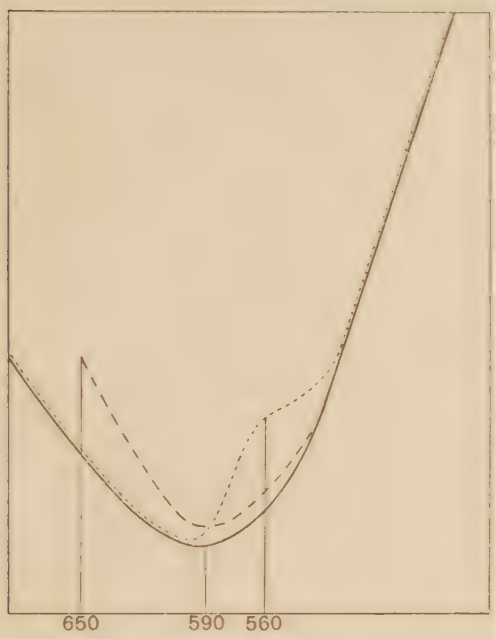


Fig. 16. The persistence-values (the reciprocals of the brightness-values) of the normal eye: the 'green'-blind ....., and the 'red'-blind - - - -. (Ferry.)

malformations in the higher visual centres (though it is still not impossible that, in the instance of Frau Professor R., rods may have taken the place of cones in the fovea with no diminution of acuteness of sight). At all events, the fact that there are well-marked instances of foveal blindness in conjunction with total colour-blindness is conclusive of the non-existence of normally functioning cones in those cases in which it occurs.

The luminosity-spectrum of individuals affected with either of the two forms of red-green blindness has been obtained with much exactness by Ferry by the method of flicker-photometry. He finds that the persistence of a colour-impression varies inversely with the luminosity, and is independent of the character of the colour. See Fig. 16.

Literature (to VIII and IX): Parinaud, La Vision (Paris, 1898); v. Kries, Abhandl. z. Physiol. d. Gesichtsempfindungen (Leipzig, 1897); Ueber die Farbenblindheit d. Netzhautperipherie, Zeitsch. f. Psychol., xv. 247 (1897); Ueber Farbensysteme, ibid. xiii. 241 (1897); Krit. Bemerk. zur Farbentheorie, ibid. xix. 175 (1898); ibid. xv. 327 (1898); v. Kries and Nagel, ibid. xxiii. 161 (1900); Polimanti, Ueber die sogenannte Flicker-photometrie, Zeitsch. f. Psychol., xix. 263 (1899); M. Sachs, Eine Methode d. object. Prüfung des Farbensinnes, Arch. f. Ophthal., xxxix. 108 (1893); and Ueber den Einfluss farbiger Lichter auf die Weite der Pupille, Pflüger's Arch., lii. 79 (1892); E. Brücke, Ueber einige Consequenzen der Young-Helmholtz'schen Theorie, Sitzber. Akad. Wiss. Wien, lxxx (3), 3. Juli, 1879.

X. Newton's Law of Colour-mixtures. This law states that if there are two pairs of indistinguishable light-mixtures, the double mixtures formed by uniting them two and two will also be indistinguishable; as a particular case, one pair of light-mixtures may be the same as the other pair, and hence the law covers the supposed constant equivalence of two like-appearing light-mixtures (whether coloured or colourless) under all variations of objective intensity of illumination. The case which is of especial interest on account of the bearing which it has had upon the theory of Hering is that in which a white (grey) is made, on the one hand, out of red and blue-green, and on the other out of blue and yellow, and the intensity of one or the other combination is diminished until the two are equally bright; if, now, the illumination for both mixtures be much reduced, do they continue to be of equal brightness? For an account of the history of this question see Tschermak, 'Ueber d. Bedeutung d. Lichtstärke u. d. Zustandes des Sehorgans für farblose optische Gleichungen,' *Pflüger's Arch.*, 70, 297. The law in its general form was tested experimentally and affirmed to be correct by Maxwell and by Aubert by means of the colour-wheel. v. Kries and Brauneck (1885) tested it by spectral lights, and again declared it to be valid. At the same time Hering published the results of his own investigation of the question, both by coloured papers and by a colour-mixing apparatus, and declared the 'complete constancy' of colourless and of

coloured equations under changing illumination. The next year, in his paper 'Ueber Newton's Gesetz der Farbenmischungen,' he reaffirmed this result in the strongest terms, and declared that any departure from Newton's law would be wholly inconsistent with the nature of things; he maintained in particular that such equations were not affected by the local condition of the retina, by fatigue, nor, in fact, by anything that could affect the temporary excitability of the eye. v. Kries also announced, in two papers of 1878 and 1882, that equations of all kinds persisted, no matter what the condition of the eye. Nevertheless, the law is now known not to hold: two whites of different light-ray constitution (red and blue-green as compared with yellow and blue) differ greatly in relative brightness, according as they are seen at a bright or a faint illumination (Ladd-Franklin, *Proc. Int. Cong. of Psychol.*, 1892; Ebbinghaus, *Zeitsch. f. Psychol.*, 1893).

The phenomenon is readily explained as a result of the regeneration of the visual purple, the connection of which with the supplementary vision of a faint light was affirmed in 1892, and put beyond question by König in 1894; this pigment is most effective for green light, and hence that member of the equation which contains green as one element of the mixture shines out brilliantly when the illumination is very much reduced. The exhibition of this phenomenon is now a common laboratory experiment. This worked strongly against the Hering theory as held at that time, but Hering has now admitted the fact of the departures from Newton's law, and also of their being due to the regeneration of the visual purple.

Literature (to X): Tonn, Ueber die Gültigkeit v. Newton's Farbenmischungsgesetz, Zeitsch. f. Psychol., vii. 279 (1894); Tschermak, Ueber die Bedeutung d. Lichtstärke u. d. Zustandes des Sehorgans für farblose opt. Gleichungen, Pflüger's Arch., lxx. 297 (1898); Ladd-Franklin, Psychol. Rev., v. 309 (1898).

XI. The After-image. The phenomena of positive after-images (persistent retinal or nervous excitation) have been, of late years, very obscure, but the subject has been much cleared up by Munk (see Recurrent Vision). One thing that is plain is that the achromatic and the colour constituent of the image (whether positive or negative) run a different course, and even that the red-green and the blue-yellow portions of a mixed sensation do not alternate synchronously (Walther, *Pflüger's Arch.*, 1898). Another thing that is quite certain is that the Helmholtz explanation of the negative after-image is wholly inadequate. It was first shown by Maria Bokowa (*Zeitsch. f. rat. Med.*, 3, xvii. 161, 1863) that the wearing of coloured glasses, if side-lights are wholly shut off, will bring about temporary colour-blindness. Coloured objects, if gazed at with absolutely constant fixation, become colourless; but they do more than that. There is one simple experiment, devised by Hering, which is alone enough to disprove at once the assumption of Helmholtz that the negative after-image is caused by a residual fraction of the self-light of the retina. If one stands in front of a window, in a bright light, and fixates for a while a patch of colour, say red, it is then only necessary to draw down a shade, or to go to a darker part of the room, to find that the patch, the eyes being still open and gazing at the red, has turned to a brilliant blue-green. This is quite incomprehensible on the view of Helmholtz; he would have us believe that although the eyes are open and gazing at red paper in light as intense as that of the ordinary room, nevertheless the self-light of the retina pushes itself so to the fore as to counterbalance, even in its semi-reduced condition (fatigue for red), an excitation which should normally be red. That, if the eye should look at white, fatigue for red would cause it to see only green is conceivable; but how can there be any sufficient cause for the production of green when the eye is looking at the most saturated attainable red?—for red, on the Helmholtz theory itself (*Physiol. Optik*, 370), contains no admixture of white. That the self-light of the retina is wholly inadequate to the production of after-images has been shown in detail, with spectral lights, by Hess, but this simple experiment is sufficient to prove it to any unprejudiced observer. There are only two ways in which this intense green-vision during the looking at red can be accounted for: (1) to suppose that after excessive chemical action of one kind nature quickly goes to work to perform the opposite process in amount proper to restore the balance (the opposite process theory), or else (2) that a chemical substance having been partially dissociated by red light, the unstable residuum becomes in turn destroyed, in the interest of the restoration of the retina to a *tabula rasa* for the reception of fresh impressions (the molecular dissociation theory).

Literature (to XI): Bidwell, On the Recurrent Images following Visual Impressions, Proc. Roy. Soc., lvi. 132 (1894); Bosscha, Prim., sec. u. tert. Netzhautbilder nach moment. Lichteindrücken, v. Graefe's Arch., xl. 22 (1894); Hess, Studien über Nachbilder, ibid. xl. (2), 259; Hess and Pretori, ibid. xl. 1 (1894); Hess, ibid. li. 225 (1900); Parinaud, Ann. d'oculiste, cxii. 225; Rev. Scient., 4e sér., iii. 709, iv. 134 (1894); Hamaker, Ueber Nachbilder nach momentaner Helligkeit, Zeitsch. f. Psychol., xxi. 1 (1899); Munk, Die Erscheinungen bei kurzer Reizung des Sehorgans, Zeitsch. f. Psychol., xxiii. 60 (1900). (C.L.F.–E.B.T.–J.McK.C.)

Vision (defects of): Ger. *Gesichtsstörungen*; Fr. *troubles de la vision*; Ital. *disturbi della vista* (or *visione*). Vision may be defective as to any one of its three fundamental functions: as concerned with (1) light, (2) colour, (3) form, shape, distance (acuity), &c. As vision is possible in a considerable portion of the retina, any marked variation in the distribution of retinal sensibility would give rise to (4) defects of the visual field. A further characteristic of human vision is the co-ordination of the two eyes, which if defective gives rise to (5) a defect of binocular vision. Anatomically and physiologically, defects of vision would be classified according to the part of the eye or the nervous mechanism of vision that is affected. The class of defects thus outlined will also be noted.

(1) Defects of light-perception are present in all severe cases of Blindness (q. v.); but so long as any power of vision remains some power to distinguish light from darkness is retained. Abnormalities in light-perception consist in a divergence from the normal conditions of illumination yielding clear vision. Night-blindness (q. v.) and Day-blindness (q. v.) are of this type. Variations in different individuals have been noticed as to the smallest visible light under given conditions, and as to the smallest distinguishable difference between illuminations; and these undoubtedly exceed in some cases what might be regarded as normal variations. As specific defects, however, they have not been described. Variations in the distribution of light-sensibility over different parts of the area, and the existence of the Blind Spot (q. v.), are also pertinent in this connection. On the general conditions of light-stimulation, see Vision I–V. See also Brightness, and cf. Optics.

(2) Defects in colour-vision may be regarded as (*a*) Colour-blindness (q. v.; see also Vision, VI ff.), and (*b*) subnormal and imperfect colour-vision.

(*b*) A diminished sensibility to colour-distinction is very common, and may be confused with colour-blindness. Moreover those slightly colour-blind (for the degree of colour-blindness varies greatly) may also have diminished facility in colour-distinction. This latter power is subject to education. The nature of the confusions concerned are not those characteristic of true colour-blindness, but appear as confusions of tints and shades, and of colours near together in the spectrum, or of mixed colours with similar components. The hesitation and slowness in matching colours in the tests for Colour-blindness (cited under that term) often reveal a poor colour-sense, although in the end the matchings are correctly made.

(3) If the inability to adjust the refractive mechanism of the eye is such that (for certain distances) the image is focussed at a point in front of the retina, Myopia (q. v.) occurs; if behind it, Hypermetropia (q. v.). If there is a subnormal range of Accommodation (q. v.)—a condition incident to the growing inelasticity of the lens with age—there is Presbyopia (q. v.). If the defect is such that vertical lines are not clearly seen at the same time with horizontal lines, there is Astigmatism (q. v.). Such a defect may be due to irregularities in the cornea, in the shape of the eyeball, in the lens or in the muscles of accommodation. Total absence of the lens is termed Aphakia (q. v.), and produces an excessive hypermetropia. The common method of expressing the acuity of vision is by means of the formula $V = \frac{d}{D}$, in which V expresses the acuteness of vision, d the distance at which the test-object is distinguished, D the normal distance at which such an object should be visible (the distance accepted is that at which it subtends an angle of five minutes at the fovea). Letters and various forms (the forms being preferred as less familiar and thus less apt to be guessed rather than read) are used of standard sizes and held at certain distances; the test with large letters at long distances yielding somewhat different results than small ones at short distances. If the numerator d is used to express in metres the distance at which the object is seen, and the denominator D the number of type on the test-board, then the fraction (e. g. $\frac{6}{12}$) tells not only that the subject has half the normal acuteness of

vision, but indicates how the test was arranged. There may be supernormal as well as subnormal visual acuteness. The two eyes may differ in their refractive powers, such difference being termed (when serious enough to be a defect) ANISOMETROPIA (q. v.); in such cases there is a strong tendency to use the more nearly normal eye in preference to both eyes. Another form of defect consists in an inability to maintain accommodation for a considerable period without excessive strain and fatigue; such a condition is termed ASTHENOPIA (q. v.). Defects in the perception of size, shape, and distance have not been specifically noted, apart from refractive errors and errors in binocular adjustment, except that in cases of slight detachment of the retina (when vision may be retained) the rods and cones preserve, at least for a time, their old local function, and objects looked at suffer corresponding distortions (METAMORPHOPSIA, q.v.); Wundt, among others, has had, and has recovered from, this defect. It is of importance in connection with theories of SPACE (perception of, q. v.). In tests of the normal capacity in this respect, such as are customary in the psychological laboratory, considerable variations are found. Abnormal variations are usually dependent upon a general imperfection of vision or upon the defects just noted.

(4) The normal field of vision by the retina and the characters of vision in different parts of it are determined by the PERIMETER (q. v.). (See INDIRECT VISION.) Variations from the normal may occur in almost endless ways. Such restrictions of the retinal field are of great importance not only in practical diagnosis, but in the study of the nervous and cerebral substrata of vision. Of special interest is the condition termed HEMIANOPIA or HEMIANOPSIA (q. v.), in which a lateral half of each retina is affected. This usually points to a central nervous affection.

(5) Defects of binocular vision consist in a relative inability to command single vision with the two eyes; the double vision resulting from this defect is termed DIPLOPIA (q. v.). There may also be erroneous projection in the field of vision. The most frequent causes of binocular defect are over-strong action of certain of the ocular muscles, usually the internal rectus, or paralysis or weakness of one or other of the muscles in one eye. This condition, which is termed STRABISMUS (q. v.), varies considerably according to the particular muscles affected. A marked inequality between the two eyes in other respects is also likely to interfere with complete binocular vision, and to produce a greater dependence upon the perception of the normal eye. A binocular defect may also consist in an inability to maintain CONVERGENCE (q. v.) for a considerable time without excessive strain and fatigue; such a condition would be a form of asthenopia.

From the point of view of the location of the visual defect, abnormalities in the refractive parts of the eye have been sufficiently noted. The interest here pertinent in defects in the extra-ocular parts may centre in the muscles, which have also been considered; or in the fact that these muscles are represented both subcortically and cortically, lesions in the centres giving rise to paralysis and spasms of definite types (for the forms of muscular defect and their anatomical relations to the nervous centres see below, Norris and Oliver, op. cit., and Gowers, op. cit.). Defects in the nervous mechanism may be in the retina, in the optic nerves, and in the lower or higher (subcortical and cortical) cerebral centres. Local diseases of the retina and optic nerve are mainly of ophthalmological interest (see the literature cited below). Affections of the optic tract, subcortical centres, cortical centres, and the connections between these have been studied with reference to the manner of connection of the retinal fields with the fibres and cells in this system. Although consensus as to detail is lacking in regard to the precise location of these centres, the subcortical centre is usually assigned to the corpora quadrig. anter., the corpora gernic. later., and the thalamus opt., and the cortical to the occipital lobe. Injury to these produces blindness in certain portions of the retinae according to the particular areas or fibres affected. The fact that each retina is connected with each hemisphere brings it about that injury to the centre (or tract) of one side produces half-blindness (hemianopsia) of each eye (see Fig. 7 under VISION). The varieties of hemianopsia, and particularly the retention or loss of vision in the central portion, the association of blindness in the upper and lower, nasal and temporal, halves of the two eyes indicate an extremely complicated scheme of connection. Injury to the occipital cortex may also produce mental blindness (see BLINDNESS, mental; cf. references given also under HEMIANOPSIA). Finally functional affections of vision of various types occur. AMAUROSIS (q. v.) and AMBLYOPIA

(q. v.), occurring without recognizable ophthalmoscopic changes, are usually considered to be of this class. General anaemia, neuralgia, or neurasthenia, severe headaches, &c., may bring on temporary fogginess of sight, localized anaesthesia (as hemianopsia), diminished colour-perception, subjective ocular appearances, and the like; while in HYSTERIA (q. v.) peculiar varieties of functional blindness occur. Subjective visual sensations are probably more frequent than those of any other sense, and appear as hallucinations in dreams, insanity, and other unusual nervous conditions (trance, hypnosis, &c.). See HALLUCINATIONS, and ILLUSIONS.

This article treats only of such defects and abnormalities of the processes concerned in vision as are instructive for the comprehension of normal vision. Diseases of the eye as such are not specifically included.

Literature: NORRIS and OLIVER's System of Diseases of the Eye (1897 and later); NOYES, Diseases of the Eye (1897); SWANZY, Diseases of the Eye (6th ed., 1897). See also the literature cited under the special topics referred to, notably VISION. (J.J.)

Vis maior [Lat.]: see ACT (in law).

Visual Area (measurement of): Ger. *Augenmass*; Fr. *estimation à vue d'œil*; Ital. *misurazione ad occhio*. The name given to the comparison of distances in the plane field of vision by the unaided eye. Cf. EYE MOVEMENTS.

The relative sense-discrimination is constant (i.e. Weber's law holds) over a certain range of moderate distances, in the estimation of which the eye has had constant practice in everyday life. The threshold is approximately $\frac{1}{60}$.

Literature: the experimental investigations, of which there are a large number, begin with WEBER in Wagner's Handwörterb. d. Physiol., iii. 2 (1846), 558, and Ber. d. sächs. Soc. (1852), 85; HEGELMAYER in Vierordt's Arch., xi. (1859), 844; FECHNER, Elem. d. Psychophysik, i. 211, and Hauptpunkte d. Psychophysik, 338; VOLKMANN, Physiol. Unters. im Gebiete d. Optik (1863), i. 117; CHODIN in Arch. f. Ophthal. (1877), xxiii. i. 92. See also WUNDT, Physiol. Psychol. (4th ed.), ii. 131; HELMHOLTZ, Physiol. Optik (2nd ed.), 740; VON KRIES, Helmholtz' Festschrift (1891); MÜNSTERBERG, Beitr. z. exper. Psychol., ii. 125; HIGIER, Philos. Stud. (1892), vii. 232. (E.B.T.)

Visual Axis: Ger. *Gesichtslinie*; Fr. *ligne visuelle*; Ital. *asse visuale*. A synonym for the LINE OF VISION (q. v.) or line of sight.

It is not to be confused with the optical axis of the eye. (E.B.T.)

Visual Sensation: see VISION.

Visualization: Ger. (no single term); Fr. *visualisation*; Ital. *visione interna, endovisione* (suggested—E.M.) Mental imaging so far as it involves reproduction of visual experiences.

The most interesting point for the psychologist is the diversity of visualizing power in different individuals. Some are capable of calling up mental pictures scarcely, if at all, inferior in detailed distinctness of form, colour, and graduation brightness to the objects as actually seen by the bodily eye. On the other hand, there are some few who have scarcely a rudiment of visualizing power. Between these extremes a great number of intermediate stages are found. Cf. TYPE (mental).

Literature: GALTON, Inq. into Human Faculty; the literature of TYPE (mental). (G.F.S., J.M.B.)

Vis viva [Lat.]: Ger. *Vis viva, lebendige Kraft* (not to be confused with *Lebenskraft*); Fr. *vis viva, force vive*; Ital. *forza viva*. Living force; the quantity represented by the product of the mass of a body into the square of its velocity.

It has nearly disappeared from current use as a physical quantity, being replaced by the term *energy*, which is one-half the *vis viva*.

The term arose from the fact that some effects of the power of a moving body were proportional to the simple velocity, and others to the square of the velocity. Thus arose the conception of *momentum*, proportional to the velocity, and *living force*, or *vis viva*, proportional to its square. (S.N.)

Vital Properties: see LIVING MATTER.

Vital Sensation: see ORGANIC SENSATION.

Vitalism: see LIFE, and cf. LIVING MATTER.

Vitality [Lat. *vita*, life]: Ger. (1) *Vitalität*, (2) *Lebenskraft*; Fr. (1) *vie*, (2) *vitalité*; Ital. (1) *vita*, (2) *vitalità*. (1) That which belongs to living organisms as constituting their LIFE (q. v.). Cf. VITALISM, and LIVING MATTER.

(2) Relative efficiency in the vital processes, (*a*) in degree with reference to a normal condition (as in the phrase 'impairment of vitality'), or (*b*) in endowment as compared with other individuals or species (as 'the vitality of an oak seed'). (J.M.B.)

Vitascope: see ILLUSIONS OF MOTION AND MOVEMENT, I, *Visual.*

Vividness [Lat. *vivere*, to live]: Ger. *Lebhaftigkeit*; Fr. *vivacité, intensité*; Ital. *vivezza, vivacità.* (1) Strength or intensive degree of an experience of any sort.

(2) By some considered a third original property of images additional to quality and intensity.

As a technical term the word has been employed to indicate a distinction between sensation with perception on the one hand, and idea on the other, the former being distinguished from the latter by greater vividness (Hume's distinction between 'impression' and 'idea,' *Treatise*, i. sect. 1, and iii. sect. 7). Thus the vividness attaching to direct experience of the external world becomes the test or sign of reality (Leibnitz), and so a criterion of belief (Volkmann). It is sometimes argued (Rabier) that relative vividness or intensity is the only distinction between perception and representation, and that artificial vividness attaching to memory or imagination may be the sufficient cause of illusion.

While undoubtedly true that vividness is primarily a property of sensory or direct experience, yet the psychophysical nature of it—described by the words strength, vivacity, vigour, liveliness, all used by Hume—is still obscure. Some hold that—like all intensity, or more certainly so—it is a qualitative distinction; others (recently Münsterberg) find in it an original property as in definition (2).

Literature: HUME, as cited; VOLKMANN, Lehrb. d. Psychol., ii (with literary citations); RABIER, Leçons d. Psychol.; MÜNSTERBERG, Grundzüge d. Psychol., i; the textbooks of psychology generally. (J.M.B., G.F.S.)

Vivisection [Lat. *vivus*, alive, + *sectio*, a cutting]: Ger. *Vivisection*; Fr. *vivisection*; Ital. *vivisezione.* Experimentation upon living organs or organisms in which vital processes form an essential element in the experiment.

The word has lost all trace (except in the minds of anti-vivisectionists) of its derivative meaning, dissecting alive, and is commonly used to designate all experiments, physiological, pathological, or anatomical, in which life, or vital process, of the animal or organ forms an essential part. (C.F.H.)

Vocal Cords (**Ligaments** or **Bands**) [Lat. *vocalis*, sounding]: Ger. *Stimmbänder*; Fr. *cordes vocales*; Ital. *corde vocali.* Membranes of the larynx concerned with voice production. See VOCAL ORGANS. (C.F.H.)

Vocal Organs: Ger. *Stimm-(Laut-)organe*; Fr. *organes vocaux*; Ital. *organi vocali.* The apparatus for the production of sounds by the voice.

Nearly all air-breathing animals are provided with some sort of a vocal apparatus for recognition calls, warning cries, &c., and throughout the mammalian phylum the general plan of this mechanism is very similar in spite of great diversity in the character of the voice produced. The requirements of articulate speech in human beings have involved no important change in this general plan, but for the most part an increase merely in the range and delicacy of movement of the parts. This apparatus consists essentially of a pair of membranes or cushions (the so-called vocal cords) stretched across the trachea and supported by cartilages, to which are joined muscles connecting the cartilages to each other and to surrounding parts of the skeleton, so arranged as to vary the length, tension, and mass of the membranes and the position of the organ as a whole. Variations in the size and shape of the air columns above and below the vocal cords are also important factors in vocalization.

The lower Amphibia have only feebly developed laryngeal cartilages; but the frogs and other Anura have a well-developed voice box with vocal cords and the necessary muscles, so that these are the lowest animals which can properly be said to possess a voice. They illustrate also the important part played by the form of the air column set into vibration, for during vocalization a single or paired air-sac in the floor of the mouth is distended to form a powerful resonator. In birds there are two voice boxes, an upper and a lower. The upper corresponds to the larynx of other animals, but does not participate in vocalization. The lower voice box, or syrinx, lies at or near the union of the trachea and the bronchial tubes, where the cartilaginous rings of the trachea or bronchi are modified to form a resonance chamber within which are vibratile membranes which act like the vocal cords, and whose tension may be altered by appropriate muscles. The long trachea of birds serves as a resonator whose efficiency is in some cases greatly strengthened by further elongation produced by coiling the trachea upon or even within the sternum. In reptiles the larynx has moved upwards and, as in mammals, comes into relation with the hyoid bone. Some of the laryngeal cartilages have probably been derived phylogenetically from branchial, or visceral, arches of the

gill-bearing vertebrates, as the hyoid bone is known to have been.

The human vocal organs have to produce changes in the loudness, pitch, and quality of tones. The first is accomplished by variations in the strength of the air-blast forced through the larynx, the second chiefly by changes in the length and tension of the vocal cords, and the third mainly by changes in the form of the resonance chamber between the vocal cords and the lips. The larynx, with its intrinsic and extrinsic muscles, and the entire cavity of the mouth, pharynx, and nose, with their contained organs, are therefore necessary parts of the organs of voice.

The larynx, or voice box, consists of nine cartilages bound together by movable articulations, enclosing the upper end of the trachea, which is here contracted to a narrow opening, the glottis, bounded by membranous folds, the vocal cords. Of these cartilages, six are in pairs and three are unpaired, viz. the thyroid, cricoid, and epiglottis. The cricoid forms the base of the larynx and completely encircles the upper end of the trachea. It has been compared to a signet ring with the seal on the dorsal side (see Fig. 1). The thyroid cartilage covers the ventral or front side of the larynx with two broad plates, or alae, extending dorsally and enclosing its sides. Each of those alae articulates with the cricoid at the side (Fig. 1), thus permitting a rocking motion between these cartilages on a transverse axis. The epiglottis is a leaf-like plate of cartilage attached by a slender stalk to the inner face of the thyroid cartilage in front, at the point of union of the alae. It is otherwise free and overhangs the upper opening of the larynx. Of the paired cartilages, the arytenoids are the most important. These are three-sided pyramids with their bases resting on the dorsal and highest part of the cricoid and their apexes approaching each other in the middle line dorsally of the opening of the glottis. The vocal cords extend from the arytenoids forwards to the inner face of the thyroid cartilage near the middle line (Fig. 2). The cornicula laryngis are articulated with the summits of the arytenoids, and the cuneiform cartilages are embedded in the mucous membranes just above the cornicula. They are frequently absent.

These cartilages are movably articulated with each other, and the intrinsic laryngeal muscles (seven on each side and one unpaired extending between the arytenoid cartilages) are so related to them as to cause a variety of complex movements of rotation of the cartilages upon each other. By means of the intricate lever movements thus produced the positions of the vocal cords are varied in two ways, viz. (1) the width of the opening of the glottis between them may be changed, and (2) the length, thickness, and tension of the cords themselves may be changed. These two movements may take place independently of each other. The arrangement of the principal muscles involved may be gathered from Figs. 1, 2. The extrinsic laryngeal muscles may approximate the larynx and hyoid bone (thyro-hyoid muscle), or they may elevate the whole hyoideo-laryngeal apparatus (mm. genio-hyoideus, mylo-hyoideus, digastricus, stylo-hyoideus, hyoglossus), or they may depress the whole apparatus (mm. sterno-hyoideus, sterno-thyroideus, omo-hyoideus). They play an important part in varying the length of the air column in the production of tones of different pitch. The shape of this resonance chamber is also modified by all the other muscles of the pharynx and mouth.

Returning now to the larynx, it consists, as we have seen, essentially of the vocal cords, cartilaginous supports for these, and the muscles necessary for their regulation. The cavity of the larynx opens widely below into the windpipe; it is constricted in the middle by the vocal cords (Fig. 3), and again, higher up, by the ventricular bands or false vocal cords. Between these two pairs of membranous folds is a capacious dilation on each side, the ventricles of Morgagni, and above the ventricular bands the cavity again becomes very wide. This latter cavity communicates directly with the pharynx. It is overarched by the epiglottis, and this organ may be pressed down like a valve to shut off the cavity of the larynx from the pharynx. This is said to occur in the act of swallowing, though the sphincter muscles surrounding the superior laryngeal aperture are sufficient to effect the closure of this aperture without the aid of the epiglottis. The epiglottis probably has an important function in modifying the quality of the voice.

Much ingenuity has been expended to discover the true functions of the ventricular bands and the ventricles of Morgagni. The bands are well provided with mucous and serous glands, and the ventricles doubtless serve to contain this secretion and distribute it to the vocal cords. The bands, besides serving to protect the vocal cords from above, have also a valvular action, serving by

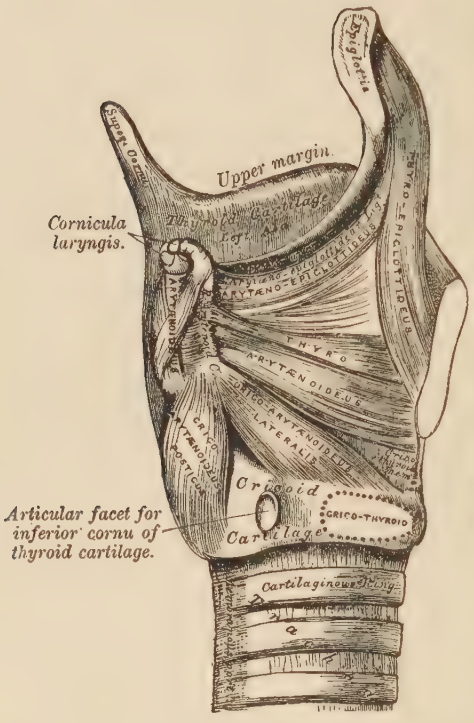


Fig. 1. The larynx and its muscles as seen from the side, the right ala of the thyroid cartilage having been removed. From Gray's *Anatomy*.

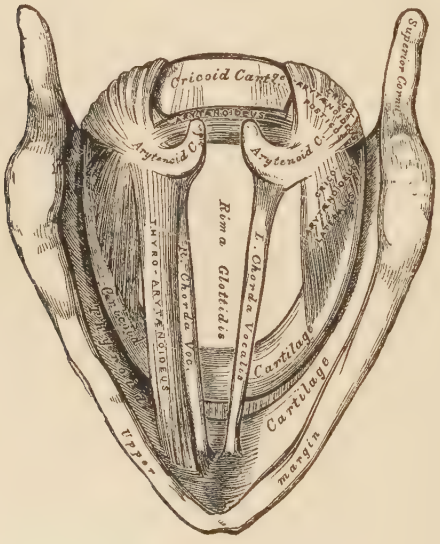


Fig. 2. The interior of the larynx as seen from above, enlarged. From Gray's *Anatomy*.

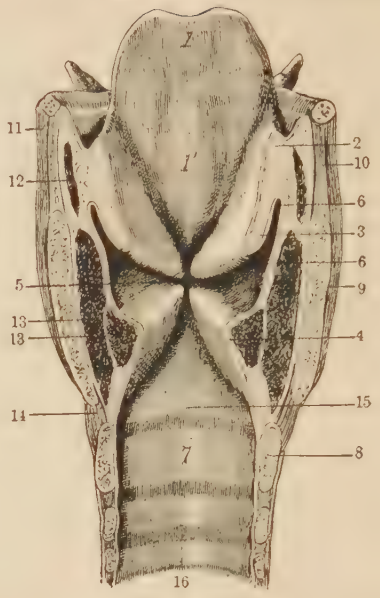


Fig. 3. Vertical transverse section of the larynx. (After Testut, from the *American Textbook of Physiology*.) 1, posterior face of epiglottis; 1′, its cushion; 2, aryteno-epiglottic fold; 3, ventricular band, or false vocal cord; 4, true vocal cord; 5, central fossa of Merkel: 6, ventricle of larynx; 6′, its ascending pouch; 7, anterior portion of cricoid; 8, section of cricoid; 9, cut surface of thyroid; 10, thyro-hyoid membrane; 11, thyro-hyoid muscle; 12, aryteno-epiglottic muscle; 13, thyro-arytenoid muscle; 13′, its inner division contained in the vocal cord; 14, crico-thyroid muscle; 15, subglottic portion of larynx; 16, cavity of the trachea.

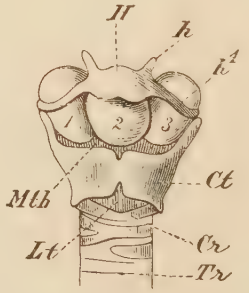


Fig. 4. Larynx of the chimpanzee. (After Wiedersheim.) *Cr.*, cricoid cartilage; *Ct.*, thyroid cartilage; *H*, body of hyoid bone; *h* and *h′*, its small and large cornua; *Lt.*, ligamentum crico-thyroideum; *Mth.*, ligamentum thyreo-hyoideum; *Tr.*, trachea; 1, 2, 3, the three resonance cavities.

their apposition to close the air passage to outgoing currents, though they offer no obstruction to the inward current. As a matter of fact, the chief significance of the ventricles and ventricular bands is probably vestigial. In some apes the ventricles are enormously enlarged to form the 'vocal sacs,' which, when distended with air, may extend far down the neck and serve as powerful resonators (see Fig. 4).

In attempting to explain the practical working of the vocal organs in the production of speaking and singing tones observers have naturally turned to the various types of musical instruments for suggestive analogies. But it would appear that there is no single artificial instrument with which the vocal organs can be directly compared, and indeed the conclusions reached by those who have most exhaustively studied the vocal mechanism are so inharmonious that it cannot be asserted positively in what class or classes of instruments these organs should be placed.

The larynx is commonly described as a reed pipe with a membranous tongue. Helmholtz, in comparing the vocal cords with membranous reeds, says, 'They have the advantage over all artificially constructed tongues of allowing the width of their slit, their tension, and even their form to be altered at pleasure with extraordinary rapidity and certainty, at the same time that the resonant tube formed by the opening of the mouth admits of much variety of form, so that many more qualities of tone can be thus produced than on any instrument of artificial production.' The vocal cords, like membranous reeds in general, produce the sound, not by directly beating the air by the vibrating tongue, but by emitting the air from a narrow orifice in successive puffs like a siren. The vibratory pulses thus emitted are very complex, Helmholtz having demonstrated overtones up to the 16th partial, when one of the brighter vowels is sung by a deep bass voice.

According to the conception of Helmholtz, the quality of the voice is determined mainly in two ways: (1) by the form and tension of the vocal cords and their method of apposition, which will determine the number of upper partials in the tone as voiced in the larynx; and (2) by the form of the resonance chamber above the larynx, which will determine which one of these numerous partials will be reinforced. The quality of all musical sounds is dependent upon the relative force of the upper partials to the fundamental pitch, and Helmholtz asserts that vowel qualities of tone are essentially distinguished from the tones of most other musical instruments by the fact that the loudness of their partial tones does not depend solely upon their numerical order as compared with their fundamentals, but preponderantly upon the absolute pitch of those partials.

The consonants are combinations of noises which have no definite pitch, and hence cannot readily be expressed in terms of musical notation. The physiology of their production is, however, more easily studied than is that of vowel sounds, and indeed lies at the basis of the conventional classifications of spoken sounds into labials, dentals, &c. For the details of the musical composition of the several vowels and the physiological movements necessary to produce them and the consonants, the reader must be referred to special works. It is obvious from what precedes that the act of vocalization is the most complicated and delicate of all the special muscular mechanisms.

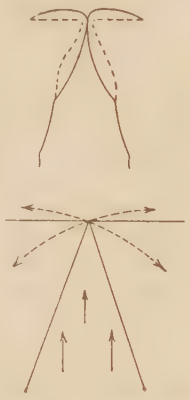


Fig. 5. Two diagrams of the vocal cords. (After Musehold.) The upper figure shows how the cords in strong chest tones are brought together in firm contact and flattened forcibly against each other. The lower figure illustrates the way in which the air pressure in the trachea presses the cords apart.

The above is the classic explanation of vocalization as developed by Helmholtz. Very recently attention has been called to the fact that the vocal cords do not vibrate as elastic membranes, but as elastic cushions; i. e. they do not vibrate in the direction of the axis of the larynx, but at right angles to that direction. This conception, like that of the membranous tongue, considers that the air is liberated through the glottis in a succession of explosive puffs; but, unlike the former theory, does not regard the cushion itself, i. e. the lips of the glottis, as the source of the vibrations of the air column above. In accord with this, Scripture moreover decides, from a study of speech curves taken from a gramophone, that the movement of the air in the mouth cavity both in song and in speech is a free vibration and not a forced one, and

that the characteristic mouth tones of vowels are generally inharmonic to the larynx tone, i. e. to the fundamental vibration of the vocal cords. In this he follows out the theory of vowel formation stated by Willis in 1830, rather than that of Wheatstone (1837), as modified by Helmholtz. The whole subject is one of extreme intricacy, and in view of the technical difficulties in the way of its study, it is not surprising that observers do not reach absolute agreement.

Literature: in addition to the general works on comparative anatomy and on human anatomy and physiology, reference may be made to the following: E. Behnke, The Mechanism of the Human Voice (1881); M. Bell, Visible Speech (1867); v. Beregszaszy, Beitrag zur Anatomie und Physiologie des Kehlkopfs, Arch. f. d. ges. Physiol., lxvi (1889); L. Brown and E. Behnke, Voice, Song, and Speech (6th ed., 1887); Czermak, On the Laryngoscope (trans. for the New Sydenham Soc.); A. J. Ellis, Speech in Song (1878); M. Fürbringer, Beitr. z. Kenntniss d. Kehlkopfmuskulatur (1875, with bibliography); C. Gegenbaur, Die Epiglottis (1872); W. Hallock, Science, N.S., xiv. 150; H. v. Helmholtz, Sensations of Tone (3rd ed., Eng. trans., 1895); Hermann, Arch. f. d. ges. Physiol., xlv, xlvii, xlviii, liii, lviii, lxi; Jeleneffy, Zur Anatomie, Physiologie und Pathologie der Larynxmuskeln, Berl. klin. Wochensch. (1888); A. A. Kanthack, Arch. f. pathol. Anat., cxvii (1889); J. of Anat. and Physiol., xxvi (1892); and Proc. Laryngol. Soc., i (1894); G. H. v. Meyer, The Organs of Speech (1884); F. Semon, Philos. Trans., London (1890); H. H. Wilder, Anat. Anz. (1892); Wheatstone, London and Westminster Rev. (Oct., 1837); Willis, Trans. Cambridge Philos. Soc., iii (1830), and Pogg. Ann. der Physik, xxiv; E. W. Scripture, Studies from the Yale Psychol. Lab., vii; Amer. J. of Sci., 4th ser., xi (1901); Science, N.S., xiii. 913 and xiv. 183; and Exper. Phonetics (1902); Garbini, Evoluzione della voce nell' infanzia (1892). (H. H.)

Voice [Lat. *vox*, a voice]: Ger. *Stimme*; Fr. *voix*; Ital. *voce*. Sound uttered from the mouth; generally restricted to human sounds, while those uttered by animals are spoken of as cries. See Vocal Organs, and cf. Speech. (C.F.H.)

Void: see Vacuum.

Volition: Ger. *Wollen, Volition*; Fr. *volition*; Ital. *atto di volontà, volizione*. The settlement by the self of a psychic issue; the adoption of an End (q. v.). See also Nolition.

Special cases are designated by the terms Choice, Decision, Resolution, Fiat, Veto (see those topics, also Will). Volition is an End-state, in the more restricted sense applying to a conation; or a Terminus, when that again is restricted to the cognized object or End (see those terms).

The adjective volitional applies strictly to volition, and should replace the adjective voluntary, which is wider, applying to all acts or dispositions of will. See Action. (J.M.B., G.F.S.)

Volitional (action, act, process, &c.) [Lat. *volitio*, act of willing, from *voluntas*, will]: Ger. *Willkür(-handlung, -vorgang*, &c.; cf. Terminology, German, 'Willens'); Fr. (*acte*, &c.) *de volition, volitionnel* (cf. Voluntary); Ital. (*atto*, &c.) *volitivo*, or *di volizione* (cf. Voluntary). Involving or issuing in a Volition (q. v.). Cf. Action.

Volitional acts are always voluntary and so always conative; but they constitute a species narrower than either of these. (J.M.B., G.F.S.)

Volkmann, Wilhelm Fridolin, Ritter von Volkmar. (1821–77.) Born and educated at Prague, where he became Privatdocent, and, later, professor of philosophy. A prominent Herbartian. See Herbartianism.

Voltaire, François Marie Arouet de. (1694–1778.) Born at Paris and educated at the Jesuit college, Louis-le-Grand. Banished from Paris (1716) for some verses on the regent, he remained at Sully-sur-Loire until (1717) he was confined in the Bastille for a satire which he, by mistake, was thought to have written. Set free on condition that he went to England to live (1726). Returned in 1729; wandered about, writing industriously, until 1732, when he took up his abode with Mme du Châtelet at Cirey. After her death (1749) he went (1750) to the court of Frederick II of Prussia; but, exasperated and angry, fled 1753. After a few years of wandering, he purchased an estate near Geneva, which remained his home for some time and the resort of the literati of Europe. He was buried in the Pantheon, receiving absolution and a Christian burial by the Church. He was one of the Encyclopedists (q. v.).

Voluminousness. This word is employed by James as a synonym for Extensity (q. v.) or extensiveness.

James' use of it (*Princ. of Psychol.*) is probably connected with the doctrine that extensity is 'three-dimensional.' This is suggested by the term voluminousness and not by 'extensity' or extensiveness.

(G.F.S., J.M.B.)

Voluntarism (in metaphysics) [Lat. *voluntas*, will]: Ger. *Voluntarismus*; Fr. *volontarisme*; Ital. *volontarismo*. The theory that the ultimate nature of reality is to be conceived as some form of will (or conation); contrasted with INTELLECTUALISM (q. v.).

The Greek mind was pre-eminently rational, and gave to experience an intellectual analysis and interpretation. The Romans and Hebrews both attached greater significance to personal will. Augustine gave expression to this in those parts of his system in which the will is made primary both in the individual and in the deity—'omnes nihil aliud quam voluntates sunt.' Consciousness itself as an act of attention is under the guidance and control of will, and God, as creator and saviour, shows his free will and 'grace.'

Mediaeval thought, which was influenced on the one hand by Greek rationalism and on the other by those motives in the Greek church which were drawn from both Hebrew and Roman sources, displayed intellectualism and voluntarism in clearly defined opposition. On the one hand, intellectualism was championed by Averroës, Thomas Aquinas, and the mystic Eckhart; on the other hand, voluntarism was defended by Avicebron, Duns Scotus, and William of Occam. The opposing theories were applied to the psychology of the individual, to the conception of the nature of the deity, to the field of ethics, and to the ideal of future blessedness. According to intellectualism, the choice of the will falls upon that which is recognized by the intellect as the good; according to voluntarism, it is the choice of the will which determines the object to be good. Each theory in this respect, therefore, was stating one side of what present psychology recognizes as the nature of value, i.e. as ultimately relative to personal choice, and not existing as such independently of such a personal choice (cf. WORTH). On the other hand, the intellectualist was seeking to maintain that, for the rational individual, value is not a matter to be decided by impulse or blind will, but is rather to be determined or, as intellectualism naturally states it, to be recognized by the reason.

On the question of the freedom of the will, intellectualism stood for determinism, and voluntarism stood for indeterminism, and in reference to this opposition the remarks just made as to the relative truth of intellectualism and voluntarism will apply, with a slight change of phrase.

In the respective ideals of future blessedness, intellectualism, following the example of Aristotle, regards the state of final blessedness as a state of contemplation (*θεωρία*). Voluntarism maintains, on the other hand, that blessedness must be regarded as an activity, and finds this blessed activity in love, appealing to the text, 'The greatest of these is love.' Finally, these opposing theories lead to opposing views as to the nature of theology. According to intellectualism, theology should be an essentially speculative science; according to voluntarism, a practical science, controlling life, but not necessarily aiming to comprehend philosophic truth. This opposition, therefore, passes over readily into that between faith and reason.

In modern philosophy the great activity of scientific thought in the time of the Renaissance tended to emphasize the intellectualist categories for the interpretation of the individual and of ultimate reality. Descartes has an interesting blending of the two principles of intellectualism and voluntarism in his 'doctrine of error.' The intellect, if acting only under its own laws, attains truth, but when the will asserts itself prematurely by pronouncing a judgment, in cases where the intellect has not achieved complete clearness and distinctness, it gives rise to error and falsity.

In Spinoza the intellectualistic principle asserts itself as modifying and transforming the individualism which expresses itself so strongly in certain aspects of his thought. Desire is for Spinoza an indication of imperfection, and passions are a source of human bondage. When all things are seen purely in rational relations, desire is stilled, the mind is freed from the passions and experiences that 'intellectual love of God,' which is for Spinoza the ideal of blessedness.

Leibnitz conceived that Spinoza's interpretation of the world in rational and logical categories left no place for the individual, or for the conception of ends or purposes as a determining factor in reality. In his own conception of the universe, Leibnitz attempted to adjust the claims of intellectualism and voluntarism; e. g. in the theory of knowledge he distinguished between the *vérités éternelles*, which conform to the laws of rational or

logical necessity, and the *vérités des faits*, which conform to the principle of sufficient reason, and this is defined more particularly as a 'choice of the best' on the part of the deity. In the metaphysics of his system voluntarism again asserts itself in his views of the monads, or individual units of which all reality is composed, for the laws of these monads are conceived to be the laws of the conscious realization of ends, while the means employed for the attainment of these ideal ends must conform to the laws of rational necessity.

More recent voluntarism owes its origin to Kant, and particularly to his doctrine of the 'primacy of the practical over the pure reason.' Intellectually, man is incapable of knowing ultimate reality, but this need not and must not interfere with the duty of acting as though the spiritual character of this reality were certain. Freedom cannot be demonstrated speculatively, but whenever man acts under a motive supplied by reason, he is thereby exhibiting the practical efficiency of reason, and thus showing its reality in a practical sense.

Following Kant, two distinct lines of voluntarism have proceeded, which have had increasing influence during the past (19th) century. These may be called respectively rational and irrational voluntarism, whose originators were respectively Fichte and Schopenhauer. Fichte starts more directly from the Kantian position, but draws the issue more sharply. Not only does Fichte make the ethical primary in the sphere of conduct, it is for him primary even in the sphere of knowledge. The whole nature of consciousness can be understood only from the point of view of ends which are set up by the self. The actual world, with all the activity that it has, is only to be understood as material for the activity of the practical reason, as the means through which the will achieves complete freedom and complete moral realization. The writers who have developed voluntarism, with greater or less reference to Fichte's principles, are Beneke, Fortlage, Wundt, Maine de Biran, Renouvier, and William James.

Schopenhauer's voluntarism asserts a more radical opposition between the will and intellect than that represented by the Fichtean line. For him, the will is by its very nature irrational. It manifests itself in various stages in the world of nature as physical, chemical, magnetic, and vital force, pre-eminently, however, in the animal kingdom in the form of 'the will to live,' which means the tendency to assert itself in the struggle for means of existence and for reproduction of the species. This activity is all of it blind, so far as the individual agent is concerned, although the power and existence of the will are thereby asserted continually. Schopenhauer attaches his system to that of Kant by the claim that the world, as conceived under the 'forms' of space and time and the 'categories' of the understanding (which Schopenhauer reduces to one, viz. cause and effect), is merely a world of presentation (Vorstellung) —it may even be called a world of illusion (Maya). The true nature of reality, on the other hand, or what Kant spoke of as the 'Thing-in-itself,' is not to be reached through the intellect, but through the immediate consciousness of the will. The world is, as it were, experienced from the inside, under the form of will, whereas through our intellectual interpretation we apprehend it merely from the outside. Intellect and will are frequently at cross purposes, but in comparison with the will, which is the real driving force or ultimate principle, the intellect is to be regarded as merely an excrescence which the will has assumed in man. The theory of voluntarism is in Schopenhauer combined with pessimism (q. v. under Optimism and Pessimism), which declares the activity of the will to be essentially a painful activity, since desire, the typical assertion of the will, always presupposes want. Release from this ever unsatisfied craving of the will may, according to Schopenhauer, be found in two ways. A temporary release is found in the aesthetic contemplation of the work of art. Here desire is stilled (cf. Plato's view of Beauty, q. v.). Complete release is found only in a denial of the will to live, and this, Schopenhauer maintains, is the fundamental principle of Buddhism and Christianity. v. Hartmann has developed Schopenhauer's principles in his philosophy of the Unconscious (q.v.). Certain sides of the philosophy of Nietzsche represent the principle of voluntarism in its irrational form. In general, it may be said that voluntarism has been a growing tendency in recent thought.

Literature: Paulsen, Introd. to Philos. (1895), 111 ff.; Külpe, Introd. to Philos. (1897); Caldwell, Schopenhauer's System in its Philosophical Significance (1896); Eucken, Einheit des Geisteslebens (containing criticism of Intellectualism, 1888); Ladd, A Theory

of Reality (1899, index, 'Will'); WUNDT, Syst. d. Philos. (1889), 373 ff.; JAMES, The Will to Believe (1897); MÜNSTERBERG, Philos. and Life. (J.H.T.)

Voluntary (action, act, process, &c.) [Lat. *voluntas*, will]: Ger. *Willens(-handlung, -vorgang*, &c.; cf. TERMINOLOGY, German, 'Willens'); Fr. *volontaire*; Ital. *volontario*. Conative, i.e. involving CONATION (q.v.).

Voluntary processes may or may not be VOLITIONAL (q.v.) processes (cf. the scheme of terminology given under ACTION). They therefore include both those acts which we actively will (volitions), and those with reference to which we are merely 'willing.' Unrestrained impulses are voluntary even when acted upon spontaneously.

Voluntary processes are contrasted with non-voluntary (aconative) on the one hand, and involuntary (contra-conative) on the other. (J.M.B., G.F.S.)

Voodoo [Creole Fr. *vaudoux*, a negro sorcerer; possibly a form of *Vaudois*, a Waldensian, these as heretics having been accused of sorcery]: Ger. *Voodoo*; Fr. *vaudoux*; Ital. *vudù*. Voodoo is a special form of sympathetic magic, partially of African origin, and current mainly among the negroes and creoles of the southern parts of the United States.

The nature of the process is generally the same as that of magic elsewhere, and takes the form of malicious and noxious charms and rites, healing and soothsaying formulas, witchcraft and omens. See MAGIC.

There is some tendency to use the word in a general sense for evil influence or ill fortune supposed to be effected by mysterious means. (J.J.)

Vulgate [Lat. *vulgata*, from *vulgare*, to make common]: Ger. *Vulgata*; Fr. *Vulgate*; Ital. *Vulgata*. The name of Latin translations of the Bible, applied first to certain African versions made from the LXX, during the 2nd century, and more especially to the Latin version of St. Jerome made at Rome at the close of the 4th century by comparison with the original Hebrew and Greek.

St. Jerome undertook the work of revision at the request of Pope Damasius, and brought to his work a knowledge of Greek and of Hebrew, which he studied for the purpose. His work received the official sanction of the Roman Church. At the invention of printing, the *Vulgate* was the first book produced from movable types. It is the basis of the Wickliffe translation into English, and through it has exercised an important influence on the development of the English language.

Literature: WESTCOTT, The Vulgate; Smith's Dict. of the Bible; HORNE, Introd. to the Scriptures; CARDINAL WISEMAN, Essays, i (1853); S. BERGER, Hist. de la Vulgate (1893); Johnson's Univl. Encyc., art. Vulgate. (A.T.O.)

W

Wage-fund Theory: Ger. *Lohnfondstheorie*; Fr. (no recognized equivalent); Ital. *teoria del fondo-salario.* The doctrine that wages depend on a ratio between population and capital.

The popular theory of wages is that they depend on demand for commodities; that the expenditure of the rich is a source of prosperity to the labourer. The English economists, from Ricardo to Mill, showed the error of this view, and proved that it is not the wealth which the capitalist consumes that really goes to the support of the labourer, but the wealth which he does not consume. These economists made the savings of the capitalists the source of demand for labour, and said that these accumulated savings or capital constituted a wage-fund, which determined the amount of real wages. Long, Thornton, Walker, and others demonstrated the practical error of this view by showing that wages often were high when the wage-fund theory would have them low, and vice versa; but the theoretical fallacy was first pointed out by Newcomb, who showed that a quantity of capital divided by a number of people cannot possibly give a rate of wages. In other words, wages are a flow, and not a fund.

Literature: WALKER, The Wages Question; TAUSSIG, Wages and Capital. (A.T.H.)

Wages [AS. *vadis*, a pledge]: Ger. *Arbeitslohn*; Fr. *salaire*; Ital. *salario.* (1) The remuneration of labour as distinct from that of other factors in production.

(2) The sums paid by property owners or their representatives to labourers for work done under the direction of the property owners.

If the degree of education required be such that the labourers must be in large measure self-directing, these payments are known as *salaries* or *fees*; the former corresponding to time wages, the latter to piece wages.

If we treat problems of wealth and distribution from the public standpoint, the first of these definitions is the logical one. If we treat them from the private standpoint, the second definition is much to be preferred. In fact, the first definition is a dangerous one, owing to the extreme difficulty of separating wages as thus defined from any other class of income whatsoever.

Literature: CANNAN, Hist. of Theories of Production and Distribution. (A.T.H.)

Wagner, Rudolf. (1805–64.) Educated at Erlangen, Würzburg (in comparative anatomy under Cuvier), and Paris. Professor of zoology at Erlangen, 1833; in Göttingen 1840, where he died. His works were influential in the sphere of physiological psychology.

Waitz, Theodor. (1821–84.) Born at Gotha, he studied at Leipzig and Jena, and travelled in France and Italy. Professor of philosophy at Marburg after 1864, and devoted during his later life to anthropological psychology. See HERBARTIANISM.

Wakefulness: see INSOMNIA.

Wallace, William. (1843–97.) Born at Cupar in Fife, Scotland; educated at St. Andrews and Balliol. He was fellow and tutor of Merton College, and succeeded T. H. Green as Whyte's Professor of Moral Philosophy at Oxford, 1882. He delivered the Gifford Lectures in 1894–5. A leader of the English Hegelian school. He translated and commented on certain of Hegel's works.

Waller's Law: Ger. *Waller'sches Gesetz*; Fr. *loi de Waller* (more commonly, *méthode, ou dégénérescence, Wallerienne*—Y.D.); Ital. *legge di Waller*, or *legge Walleriana.* The empirical rule that after section or injury to

a peripheral nerve the degenerative changes pursue a direction similar to that normally followed by the stimuli.

In 1850 it was observed that after section of a peripheral nerve the portion beyond the injury degenerates. The axis cylinder and medullary sheath decompose, and the nuclei at first proliferate and then, in event of failure to re-effect central connection, disappear. Waller explained these facts by assuming that the central system exerts a trophic influence which is abolished by section. In 1868 Vulpian published the results of a study of the spinal cord of persons who had suffered amputations. He found the cord reduced in size in the half corresponding to the limb amputated, but the changes were regarded as atrophic. Friedlander and Krause showed that these changes are limited to the centripetal system (dorsal and lateral columns, Clarke's columns, &c.), while the ventral root is unaltered (see SPINAL CORD). Although many subsequent observers report changes in the ventral roots and cells of ventral cornua, they are now known to obey a different law from the degenerations of sensory fibres. They originate in the cell and follow the same course as that normal to the stimulus (Bregmann). The applicability of Waller's law is not discredited by degenerations of disease in motor roots, for, as already noted, they too follow the direction of the stimulus and suggest a trophic influence on the part of the cell. See DEGENERATION. (H.H.)

Want: see NEED.

Wants [Icel. *vant*, wanting]: Ger. *Bedürfnisse*; Fr. *besoins*; Ital. *bisogni*. (1) Those desires which give rise to a demand for wealth.

(2) The direction taken by such demand.

Want, in the second sense, differs from demand in not being a quantitative expression. We may say that the quantity of a want which a man will satisfy under given conditions represents his demand under those conditions. (A.T.H.)

War [O.H.G. *werra*]: Ger. *Krieg*; Fr. *guerre*; Ital. *guerra*. A state of hostility, looking to or being a conflict of arms between nations, or (civil war) between a nation and a considerable part of its citizens.

Within the meaning of the provision against treason in the United States Constitution, war is levied 'if a body of men be actually assembled for the purpose of effecting by force a treasonable purpose' (*Ex parte* Bollman, 4 Crench's U. S. Law Reports, 75).

War may exist, in fact, before it has been formally declared. It makes all commercial intercourse between subjects of the belligerent powers unlawful, and suspends the right of action on their prior contracts until after the close of the war (Woolsey, *International Law*, § 117). *Articles of war*: the rules adopted in any state for the regulation of the army. Those of the United States are in the U. S. Revised Statutes, sec. 1342. See BELLIGERENCY, and NEUTRALITY.

The law of war was largely put in form by Grotius, in his *De Iure Belli ac Pacis*. (S.E.B.)

Warm Spot: see TEMPERATURE SPOT, and TEMPERATURE SENSATION.

Warning Colours: Ger. *Schutzfarben* (protective colouring); Fr. *couleurs protectrices* (protective colouring); Ital. *colori ammonitori* (suggested—E.M.). The conspicuous colours of certain organisms, especially insects, associated with noxious or nauseous qualities, or perhaps in some cases with excessive hardness or toughness, of which they give 'warning' to other creatures. (C.Ll.M.–J.M.B.)

The origin and value of warning colours have been considered by biologists in close connection with biological MIMICRY (q. v.). On the selection hypothesis they have been evolved in close association with noxious or nauseous qualities in organisms, and are due to conscious but not purposive selection (see SELECTION). Only in virtue of what in psychological analysis is termed association can they possess any value. If, as recent observations seem to show, the young animal learns by experience what is to be avoided for the future, warning colours serve as a means to render this learning more rapid and certain. In Poulton's classification of animal colours they are termed *aposematic*. When, in accordance with Fritz Müller's suggestion, different distasteful species have common warning colours, the term *synaposematic* is applied by Poulton. See MIMICRY (in biology).

Literature: A. R. WALLACE, Proc. Entomol. Soc., ser. 3, v. p. lxxx (1867); and Darwinism; J. JENNER WEIR, Trans. Entomol. Soc., 1869; A. G. BUTLER, Trans. Entomol. Soc., 1869; A. WEISMANN, Studies in the Theory of Descent (Eng. trans., 1882); E. B. POULTON, Proc. Zool. Soc., 1887, 191, Pt. II. 336–40; and literature cited under MIMICRY (in biology). (C.Ll.M., E.B.P.)

Wealth [AS. *wela*, plenty]: Ger. *Wohlstand*; Fr. *richesse*; Ital. *ricchezza*. (1) An aggregate of commodities.

(2) The value of such an aggregate, measured

by the quantity of money, or some other commodity, for which it can be exchanged.

The mercantilists laid stress on money values, the physiocrats on food values. Smith nowhere defines wealth; McCulloch defines it: 'Those articles which possess exchangeable value, and are either necessary, useful, or agreeable.' Malthus is the first prominent writer to leave the feature of valuation on one side: 'The material objects, necessary, useful, or agreeable to man, which have required some portion of human exertion to appropriate or produce them.' Mill, after some hesitation, goes back substantially to McCulloch's definition.

Modern writers have gradually recognized a necessary ambiguity or series of ambiguities in the term wealth. (*a*) It may be expressed either as an inventory or as a valuation—the distinction made in the definitions above given. (*b*) It may be either public or private (see NATIONAL WEALTH). In the former case it consists of things, in the latter case of titles. (*c*) It may be understood, or not understood, as including personal qualities. (*d*) It may be measured as a flow (income) or as a fund (CAPITAL, q. v.). If we measure it as capital, it consists only of material things; if we measure it as income, it should include services also. (A.T.H.)

Weariness: see FATIGUE.

Weber, Ernst Heinrich. (1795–1878.) Born at Wittenberg, Germany; educated at Leipzig in medicine; professor of comparative anatomy at Leipzig, 1818; of physiology, 1840. In addition to his contributions to anatomy and physiology, he had an important influence in the founding of the science of experimental or physiological psychology. See WEBER'S LAW, and SENSORY CIRCLES.

Weber, Joseph. (1753–1831.) Born at Rain in Bavaria. After holding various offices in the Roman Catholic Church, he became professor of philosophy and physics at Dillingen in 1790. After the victory of the Jesuit party, he was professor of physics, 1816–21. He died as vicar-general at Augsburg.

Weber's Law: Ger. *Weber'sches Gesetz*; Fr. *loi de Weber*; Ital. *legge di Weber*. A generalization made by Weber to the effect that the least added difference of stimulus that can be noticed is a constant proportional part of the original stimulus.

Thus, if one pound when lifted can just be discriminated from one pound and one ounce, ten pounds cannot be discriminated from ten pounds and one ounce, but the difference needs to be ten ounces. The law is thought by Fechner, Wundt, and others to hold approximately for stimuli, except those very small or very large. In a general way, the least noticeable difference is for simultaneous lights $\frac{1}{100}$, for successive lights $\frac{1}{10}$, for sounds $\frac{1}{4}$, for pressures $\frac{1}{10}$, for lifted weights $\frac{1}{20}$, and for length of lines $\frac{1}{100}$. Cf. FECHNER'S LAW, and PSYCHOLOGICAL METHODS.

Literature: that of experimental PSYCHOLOGY (q. v.); see also BIBLIOG. G, 1, *d*, and the Psychol. Index, 1 ff. in loc. (J.M^cK.C.)

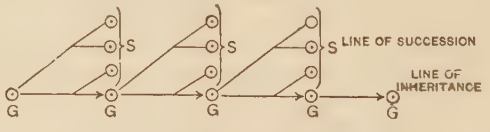
Weight Sensation [ME. *weght, wight*, from AS. *gewiht*]: Ger. *Empfindung der Schwere*; Fr. *sensation de poids*; Ital. *sensazione di peso* (or *barica*). Sensation from the active supporting or lifting of weights.

This usage is recommended. The sensation is probably a compound of TENDON SENSATION (q. v.), MUSCLE SENSATION (q. v.), and PRESSURE SENSATION (q. v.).

Literature: BASTIAN, Brain as Organ of Mind, 695; JAMES, Princ. of Psychol., ii. 189 ff., 486 ff.; MÜLLER and SCHUMANN, Pflüger's Arch., xlv. 37 ff.; FULLERTON and CATTELL, Perception of Small Differences (1892); SANFORD, Course in Exper. Psychol., expts. 33, 34, with bibliog.; see HAPTICS. (J.M.B.)

Weismannism: Ger. *Weismannismus*; Fr. *Weismannisme*; Ital. *Weismannismo*. The distinctive biological theories of August Weismann.

The following biological conceptions are generally associated with Weismann's name: (1) That there is continuity of the germ-plasm in a series of organic generations. (2) That modifications of organs and tissues acquired in the course of individual life are not inherited. (3) That the germ-plasm contains the 'determinants,' or structural germs, from which all the organs and tissues are developed, being appropriately distributed in the course of cell multiplication. (4) That natural selection is the all-sufficient cause of organic diversity. This list could easily be increased by introducing reference to Weismann's views as to PANMIXIA, GERMINAL SELECTION, &c. (see those terms).



G, germ-plasm; *S*, soma-plasm.

The diagram given herewith illustrates Weismann's views.

Literature: A. Weismann, Essays, i, ii; The Germ-Plasm; Romanes Lecture, 'On the Effect of External Influences on Development'; and 'Germinal Selection.' Consult recent expository works on organic Evolution (q.v.). Criticisms of Weismannism are Romanes, Weismannism; O. Hertwig, Zeitsch. und Streitfragen d. Biol.; Cope, Primary Factors of Organic Evolution. (C.Ll.M.)

Weiss, Christian. (1774–1853.) Born near Leipzig and educated in that city. After 1791 he studied there philology, philosophy, natural science, and theology. Doctor of philosophy in 1795, he became Privatdocent in 1796; assistant professor in philosophy, 1801; director of the Lyceum at Fulda in 1805; and councillor to the government and schools at Merseburg in 1816. He died at Merseburg.

Well-being and **Welfare**: Ger. *Wohlsein, Wohlfahrt*; Fr. *bien-être*; Ital. *prosperità, benessere*. The attainment of that which constitutes the Highest Good (q.v.) in this or that situation.

This leaves the question of the highest good open to determination; it also leaves open the question as to its absolute or relative determination in this or that situation. (J.M.B.)

Aristotle holds that well-being (εὐδαιμονία) is, by universal acknowledgment, the good. It is in their interpretation of well-being that men differ, some holding that it is pleasure, others that it is wealth, honour, &c. Aristotle's own view is that it is activity of the soul in accordance with its own proper virtue or excellence, i.e. rationality. The object of politics, according to Aristotle, is well-being (εὖ ζῆν), as distinguished from mere life (ζῆν) (see *Politics*, Bk. III. chap. ix). J. S. Mill distinguishes similarly between the interests of being or security and those of well-being; it is with the former that justice is concerned, hence its paramount importance (Mill, *Utilitarianism*, chap. v). The evolutionary school have made welfare a central conception of their ethics. Darwin makes the general welfare the ultimate ethical conception (see *Descent of Man*, chap. iv). Spencer interprets welfare as pleasant or happy life (see *Princ. of Eth.*, Pt. I. chap. iii). Contemporary German moralists also give prominence to the idea of welfare; for example, Paulsen: 'The term welfare (Wohlfahrt) may also be employed to designate this goal [the perfect life], which would suggest the subjective element involved in it, or the fact that such a life yields satisfaction (Wohlgefühl)' (*Syst. of Eth.*, Eng. trans., Introd., § 3). 'The word welfare, finally, seems suited to designate the highest good in its twofold aspect: it shows, first, that the highest good is an objective content of life, consisting in the perfect exercise of all human psychical powers; then it also suggests that such a life is accompanied with pleasure, and hence that pleasure is not excluded from the perfect life, but included in it' (ibid., Bk. II. chap. i. § 1). (J.S.)

Werewolf [AS. *wer*, man, + *wulf*, wolf]: Ger. *Werwolf*; Fr. *loup-garou*; Ital. *lupomannaro*. A conception belonging to the superstition that human beings can be turned into wolves, while retaining human intelligence.

Lycanthropy was the term applied to this in ancient times, and became equivalent to the transformation of human into animal forms. The werewolf superstition has assumed various forms in different times and countries. It was believed in as an animal that appeared in various shapes (sometimes invisible), prowled about, and devoured children. The term was also applied to a morbid assumption or simulation of animal habits and instincts, and in this sense was a form of insanity with a tendency to become epidemic. (J.J.)

Westminster Confession: Ger. *Westminster'sches Glaubensbekenntniss*; Fr. *Confession de Westminster*; Ital. *Confessione di Westminster*. The doctrinal system formulated and adopted by the Westminster Assembly of Divines (1644–7) and embodying the form of Calvinistic theology which constitutes the distinctive creed of Presbyterianism.

The Westminster Confession is the last of the great Calvinistic creeds. It embodies all the distinctive features of Calvinism in a statement notable alike for its clear and comprehensive conceptions, its accurate definitions, and the fitting language in which it is expressed. Its principal feature is the supreme emphasis it places on God's sovereignty and man's absolute dependence on divine grace for salvation, as the groundwork of all the other features of the system. The Confession still preserves substantially the form given to it by its authors.

Literature: P. Schaff, Creeds of Christendom (4th ed., 1884); A. Hodge, Commentary on the Westminster Confession (1869); John McPherson, The Westminster Confession (1881); B. B. Warfield, Presb. and Reformed Rev., April, 1901. (A.T.O.)

Whewell, William. (1794–1866.) Studied, graduated, and became a fellow at Trinity College, Cambridge; took orders in the Church of England; professor of mineralogy at Trinity, 1828–32, of moral theology or casuistry, 1838–55; master of Trinity College after 1841; Vice-Chancellor of Cambridge University after 1855.

Whole (and **Parts**) [AS. *hal*, healthy; Gr. ὅλος, entire]: Ger. *das Ganze*; Fr. *le tout*; Ital. *il tutto*. The old definition is: 'Totum est quod constat plurium rerum unione.' Psychologically, whatever is treated as a single object though capable of treatment as two or more objects (parts of the whole): by 'treated' meaning 'thought of,' 'attended to,' or otherwise 'acted upon.' (C.S.P.–J.M.B., G.F.S.)

We may say that a whole is an *ens rationis* whose being consists in the copulate being of certain other things, either not *entia rationis* or not so much so as the whole; so that a whole is analogous to a *collection*, which is, in fact, a special kind of whole. There can be no doubt that the word whole always brings before the mind the image of a collection, and that we interpret the word whole by analogy with collection. The idea of a collection is itself, however, by no means an easy one to analyse. It is an *ens rationis*, abstraction, or fictitious subject (but the adjective must be understood in a broad sense, to be considered below), which is individual, and by means of which we are enabled to transform universal propositions into singular propositions. Thus, the proposition 'all men are mortal,' with a new subject and new predicate, appears as 'The collection of men is a collection of mortals'; just as, for other purposes, and by means of other abstractions, we transform the same proposition into 'The character of mortality is possessed by every man'; and the members of the collection are regarded as less fictitious than the collection. It very often happens that an object given in direct perception as an individual is, on closer scrutiny, seen to be identifiable with a collection of parts. But it does not seem to be strictly accurate to say that the larger object of perception is identical with that abstraction, the collection of the smaller objects. It is rather something perceived which agrees in its relations with the abstraction so well that, for convenience, it is regarded as the same thing. No doubt the parts of a perceived object are virtually objects of consciousness in the first precept; but it is useless to try to extend logical relations to the sort of thought which antecedes the completion of the percept. By the time we conceive an object as a collection, we conceive that the first reality belongs to the members of the collection and that the collection itself is a mere intellectual aspect, or way of regarding these members, justified, in ordinary cases, by certain facts. We may, therefore, define a collection as a fictitious (thought) individual, whose being consists in the being of certain less fictitious individuals.

Many adjectives are used to distinguish different kinds of wholes. Certain of the phrases may be defined.

Actual whole: any whole which cannot exist without the existence of its parts. Usually identified with the *Constitute whole*. Monboddo's definition (*Ancient Met.*, i. 479) is not quite accurate.

Collective whole, or *aggregate whole*: defined by Chauvin as 'that which has material parts separate and accidentally thrown together into one, as an army,' &c. But the example shows that organization does not disqualify a whole from being called *collective*, although the term *totum per aggregationem* will no longer be applied to it, in that case. In so far as a whole is collective, any other relation between its parts is put out of view.

Composite whole: a term of Burgersdicius, who (*Inst. Met.*, I. xxii. § 7) defines it as 'quod ex duabus partibus constat quarum una est in potentia ad alterum et altera vice versa actus est alterius.' It includes the whole by information and the whole by inherence.

Comprehensive whole: a whole of logical comprehension.

Constituent whole: a whole which is essential to its parts. See UNIVERSAL.

Constitute whole: a whole whose parts are essential to it. See *Actual whole* (above).

Continuous whole: a continuum regarded as a whole. In order to define it, it would first be necessary to define CONTINUITY (q. v.). Now we have, perhaps, not yet succeeded in analysing the conception of continuity; for what the mathematicians call by that name, such as the relations of all real quantities capable of being designated to an indefinite degree of approximation by means of a whole number and a decimal, does not answer the requisites of the problem.

Copulative whole: a whole consisting of a sign which is essentially applicable to whatever certain signs, called its parts, are all applicable, but is essentially inapplicable to

anything to which any one of these signs is inapplicable.

Definite whole: a whole constituted by genus and difference.

Definitive whole: see *Definite whole* (above).

Discrete whole: the same as a *Collective whole* (above).

Disjunctive whole: a whole consisting of a sign which is essentially applicable to whatever any one of certain signs, called its parts, is applicable, but is essentially inapplicable to anything to which none of these parts is applicable.

Dissimilar whole: same as *Heterogeneous whole* (below).

Essential whole: great confusion exists in the use of this very common expression. Aquinas (*Summa Theol.*, Pt. I. lxxvi. 8) uses it in a broad sense which would make it about equivalent to Burgersdicius' composite whole, or perhaps broader. On the other hand, it is sometimes restricted to the whole *per informationem*, and this is perhaps the best settled use. But others make it include the physical and the metaphysical whole as its two species.

Extensive whole: a whole of logical extension, usually called a subjective or logical whole.

Formal whole: a comprehensive whole, especially of essential comprehension. See *Actual whole* (above).

Heterogeneous whole: a term of Aquinas; a whole whose parts are dissimilar from the whole.

Homogeneous whole: a term of Aquinas; a whole whose parts are similar to the whole, as the parts of a whole of water are.

Integral whole (a term in common use since Abélard's time): Blundevile (1599) says, 'Whole integral is that which consisteth of integral parts, which though they cleave together, yet they are distinct and severall in number, as man's body, consisting of head, brest, belly, legs, &c.' The usual definition is 'quod habet partem extra partem,' which restricts it to space. Burgersdicius, however, says that parts which differ in their ordinal places are *partes extra partes*.

Integrate whole: a pedantic variant of *Integral whole* (above).

Logical whole: same as *Universal whole* (below).

Mathematical whole: same as *Integral whole* (above).

Metaphysical whole: a whole in that respect in which a species is the whole of its genus and difference. See *Formal whole* (above).

Natural whole: a term proposed by Hamilton to replace Comprehensive or Metaphysical whole; as if that were not sufficiently provided with aliases under which to hide itself.

Negative whole: a unit regarded as a whole, as in the phrases 'deus totus est ubique,' and 'anima est tota in toto corpore.'

[*Objective whole*: a mental object apprehended as a single real thing.—J.M.B.]

Physical whole: a whole compounded of substance and accident; but some say of matter and form; and some that both come to the same thing. In the peripatetic view, however, substance is form, not matter.

Positive whole: a whole consisting of parts. See *Negative whole* (above).

Potential whole: same as *Universal whole* (below); so called because the genus does not actually, but only potentially, contain the species, &c.

Potestative whole: a term of Aquinas; equivalent to *Potential whole* (above).

Predicative whole: a whole of logical depth.

Quantitative whole: same as *Integral whole* (above).

Similar whole: see *Homogeneous whole* (above).

Subject whole: same as *Subjective whole* (below).

Subjective whole: a very venerable name for *Universal whole* (below).

Substantial whole: a whole of logical breadth.

Universal whole: see UNIVERSAL.

Whole by accident: such a whole as neither essentially belongs to the parts nor the parts to it.

Whole by aggregation or *aggregative whole*: same as *Collective whole* (above) in an exclusive sense.

Whole by information: a compound of act and power in the same kind, such as man, according to the Aristotelian theory of the soul.

Whole by inherence: same as *Physical whole* (above).

Whole by itself or *per se*: a whole which essentially belongs to its parts or its parts to it. (C.S.P.)

Wild (in biology) [AS. *wild*, wilful]: Ger. *wild*; Fr. *sauvage*; Ital. *selvatico*. Untamed; used of animals living in their native habitat, as opposed to DOMESTICATED ANIMALS (q. v.). (J.M.B.)

Will [AS. *wille*]: Ger. *Wille*; Fr. *volonté*; Ital. *volontà* (see also TERMINOLOGY, English, 'Will'). (1) CONATION (q. v.).

(2) That conative organization of which VOLITION (q. v.) is the terminus or end-state.

(3) VOLITION (q. v.).

The use of the term 'will' is so varied that it is impossible to get from the history any exclusive meaning. Three usages hold their own for the reason that they are associated with the different points of view from which the subject is approached. If we take a philosophy which approaches the type called VOLUNTARISM (q. v.), we have definition (1); and so broad may its view of conation become that its essential meaning as a mental function seems largely to disappear; this is illustrated in Schopenhauer's usage as reflected in the title of his work *The World as Will and Idea*. If we come to will from the other extreme—that of the determination of a conation, in its distinctness from other mental determinations, in a state of consciousness in which this element is dominant—we have definition (3), for which volition only is will—i.e. the case in which mental organization takes on for the first time the character and complexity to which a new name can be given.

Between these two views lies another, that given under (2) above. This commends itself not only because it is a via media, but also for intrinsic reasons. The term conation is justified mainly because it can be used for the active tendency in the abstract, apart from any concrete determination. It is thus an element in the structure of mind, and it is also that which the concrete active processes have in common. It is what the Germans call the Inbegriff of the various phenomena of action. The word conation, therefore, fills the requirement of the philosophical definition given under (1). On the other hand, volition is the term for the concrete determination of conation at the level in which the highly conscious form of organization called deliberation and choice issues in its terminus. This suffices for (3). But the stretch of the mental life, with all its forms of active determination, impulse, tendency, disposition, non-volitional-yet-voluntary action, all this remains. These are conation in the concrete, but they may not be conation determined in an actual terminus by volition. Volition considered as the limiting case of determination is included, since it is, like the earlier determinations, also one of conation.

These reasons lead us to recommend the second definition of will. It is the general notion of which all concrete conative determinations are concrete instances. It includes the entire active life, and allows a genetic theory of will from its earliest stages. It refuses, however, to call by this name the elementary and hypothetical abstraction called conation, and hypostatized in various ways as 'conatus,' 'will to live,' 'unconscious will,' &c. Such an extension is a direct subversion of the distinction between the PSYCHIC AND THE PSYCHOLOGICAL (see that topic); only the concrete forms of action are psychic and immediate to the mental subject; and the going over to the objective or psychological point of view is such a transition in meaning that no single term can be used in both the senses.

It is believed that this recommendation is in accord with the views of the greater number of competent modern psychologists. Cf. also ACTION.

Literature: for historical citations in great number see EISLER, Wörterb. d. philos. Begriffe, 'Wille.' See also the systematic psychologies, BIBLIOG. G, 2, *w*, and the topics cited. (J.M.B., G.F.S.)

Will (disorders of): Ger. *Willensstörungen, Willensdefekte*; Fr. *troubles de la volonté, aboulie*; Ital. *disturbi della volontà, disbulie* (E.M.). Impairment of normal volition.

Disorders of the will, like those of other functions, seem divisible into those of excess and defect; but the former term requires a special interpretation. An excessively vigorous will is not a disorder; but the term hyperboulia, which is literally equivalent to this, indicates an abnormal tendency to action. The tendency of an impulse, under the suggestion of a thought or motive, to engender execution, is excessive or abnormal. But this in turn may properly be regarded as a deficiency in inhibition, i.e. of the restraining power of a higher over a lower will-mechanism. The term dysboulia, which naturally indicates a difficulty in the exercise of the will, may also be considered as a form of aboulia, which indeed has come to be regarded as a general term embracing all the typical forms of morbid disorders of the will, but referring more specifically to its deficiency or extinction.

Aboulia may be defined as loss, lack, or impairment of the power to will or to execute what is in mind. In this condition there is no paralysis or disorder of the muscular system, and frequently there is no lack of desire or of realization of the end sought; but the transition from motive and desire to execution becomes abnormally difficult or impossible. The patient, as a rule, realizes his own condition, may believe that his will

power has been usurped by another person or agency, exerts himself violently to perform some simple act, and frequently succeeds in overcoming the barrier that stands between thought and action. The cases cited by Ribot of an aboulic patient keeping a servant standing half an hour before he succeeded in taking from the servant's tray a glass of water, or of another writing a legal document, but struggling a hundred times to put the flourish to his signature, are salient instances of this condition. In less extreme cases the aboulia appears as a form of persistent irresolution, of which De Quincey's *Confessions*—in his case the condition was due to and aggravated by opium-poisoning—furnish a suggestive instance. In the most extreme cases (in certain forms of melancholia) there is practically a total extinction of the will, the patient, if left to himself, sitting listless, impotent, and passive. Somewhat different, yet allied, is the extinction of the will found in extreme cases of psychic concentration, as in religious ecstasy and hypnotic trance. See TRANCE, and HYPNOTISM.

The more precise analysis of this aboulic state is difficult. Ribot distinguishes between aboulia from lack of impulse and from excess of impulse; the cases above cited belong to the former group, while those in which excessive and irrational fear or argumentation paralyzes the springs of action evidence the latter. Such fears as that of open places (AGORAPHOBIA, q. v.), or excessive balancing of motives and quibbling with pros and cons, interfere with execution quite as much as weakness of will without fear or indecision. Ribot further holds that both forms involve an impairment of emotional sensibility, an absence or bluntness of the emotions which normally incite to action. To this it may be objected that frequently there is no apathy, but an intense sensitiveness regarding the inability to carry out what is desired. Some authors distinguish three causes of aboulia—weakness of motives, doubt or fear as to the nature or outcome of the action proposed, and an embarrassment or excessive number of ideas which offset one another and prevent definite action. If we regard a normal action of the will as involving a motive sufficient and perceived, and an uninterrupted passage-way towards a definite action, the three forms of interference with the normal sequence of this process would be (1) an insensibility to the motives—lack of action by reason of lack of effective impulse; (2) a damming of the stream of action by reason of irresolution; (3) excessive hesitation as to the direction which the action is to take. It is further to be noted that the automatic and habitual functions may be readily performed while those involving consciousness are interfered with. Aboulia may also appear as a failure to inhibit or check semi-automatic actions, and then becomes allied to excess of impulse (hyperboulia) and general weakness of will, or difficulty in its exercise (dysboulia). Closely allied to and forming a part of the symptoms of aboulia in many cases is a difficulty in maintaining voluntary attention. Cf. ATTENTION (defects of); Hugonin, *Troubles de la Volonté* (1892); Richet's *Dict. de Physiol.*, sub verbo; Janet, as cited below. Impairment of will in various forms is especially prominent in NEURASTHENIA (q. v.), and forms a most characteristic symptom of it. Aboulia (or dysboulia) is also a frequent symptom in many forms of nervous weakness which involve no impairment of the intelligence. In cases of insanity it 'is most commonly found in simple melancholia or in the early stages of mania or of general paralysis' (Hyslop). (J.J.)

Literature: RIBOT, Diseases of the Will (Eng. trans.); HYSLOP, Ment. Physiol. (1895), 448 ff.; JANET, Automatisme psychol., and Névroses et des Idées fixes; BALDWIN, Ment. Devel. in the Child and the Race, chap. xiii. § 4; the textbooks of mental diseases. See also MOVEMENT (control of). (J.J.–L.M.)

Will (free): see FREE AND FREEDOM, DETERMINISM, INDETERMINISM; and cf. MIND AND BODY, PARALLELISM (psychophysical), and UNIFORMITY (4), (*d*, *e*).

Will (in law): Ger. *Testament, letzter Wille*; Fr. *testament*; Ital. *testamento, ultima volontà*. A voluntary disposition of all or part of a man's property or rights to take effect only upon his death.

Nuncupative will: an unwritten will. *Olographic* (or *holographic*) *will*: one wholly in the handwriting of the testator. *Undutiful will*: one disinheriting, in whole or part, kindred in the natural line of succession, contrary to the rules of law (*Inst. of Just.*, ii. 18, *de inofficioso testamento*).

A man has no natural right to dispose of his property after his own death by an act which is to take effect only after that event (United States *v.* Perkins, 163 U. S. Law Reports, 625, 627).

If his will survives him, it must be by force of some positive law (Heineccius, *Elementa Iuris Naturae et Gentium*, Lib. i. 287). Grotius

regards this law as simply clothing a natural right in solemn form (*De Iure Belli et Pacis*, Lib. II. chap. vi. 14); so Puffendorf (*De Officio Hominis et Civis*, Johnson's ed., Lib. I. 12, note).

Laws taxing testamentary successions rest upon this ground, that the capacity of taking under a will is a privilege granted by the state (as is also that of succession by inheritance, in case of intestacy).

Primarily, the design of a will is to dispose of property, but it may be confined to disposing of rights not in the nature of property, e.g. by its doing no more than to exercise the right of naming an executor, or a guardian for an infant child. (S.E.B.)

Will-Philosophy: see VOLUNTARISM.

Will to Believe: Ger. *Wille zum Glauben*; Fr. *volonté de croire*; Ital. *volontà di credere*. The exercise of will in matters of belief; involving a normal conative factor over and above the intellectual processes involved in the determination of the belief.

Given currency by James in the title essay of his volume *The Will to Believe*. What James means is 'the state of mind of a man who finds an impulse in him towards a believing attitude, and who resolves not to quench it simply because doubts of its truth are possible. Its opposite would be the maxim: Believe in nothing which you can possibly doubt.' (J.M.B.)

Its negative would be: Regulate your degree of belief in exact accordance with the degree of evidence that is accessible to you. (C.L.F.)

Literature: JAMES, as cited; MILLER, Int. J. of Ethics, ix. (1898) 169; discussion in Psychol. Rev., iv. (1899) 150. (J.M.B.)

William of Champeaux: see CHAMPEAUX, and REALISM (1).

Wisdom [AS. *wis*, wise]: Ger. *Weisheit*; Fr. *sagesse*; Ital. *sapienza*. The more direct and intuitive forms of apprehension or insight as contrasted with the more reasoned or discursive. (J.M.B.)

Wisdom (*σοφία*) to Plato is one of the cardinal virtues, both of the state and of the individual. It is the attribute of the highest part in either case; of the legislators in the state, of the rational faculty in the individual. Through the wisdom of this, its highest part, the whole is, in either case, wise. Aristotle distinguishes two kinds of wisdom—the speculative (*σοφία*) and the practical (*φρόνησις*). The former has to do with the unalterable and the superhuman, or with the absolute nature of things; it is synonymous with science, in the largest sense of the term, intuitive and demonstrative. The latter has to do with the contingent and particular relations of human experience, with the details of life and conduct; itself an intellectual virtue, it is the presupposition of all moral virtue, whether in the individual or in the state. (J.S.)

Wisdom (divine). The wisdom of God embraces both rational and volitional elements, and is that union of knowledge and goodness to which the creation of the world is ascribed.

In Greek thought the term *νοῦς* stood for abstract intelligence or reason, while Logos represented reason manifesting itself. Christian thought further emphasizes the practical side of the Logos, which becomes in Christ the divine thought or reason energizing as the Creator and Redeemer of the world. Christ is sometimes called the divine wisdom. If wisdom be distinguished from realizing energy, it embodies itself in the ideal, planned or purposed, world which is presupposed in the actual. Cf. ATTRIBUTES (of God), and LOGOS. (A.T.O.)

Wise Men (the seven): Ger. *die Sieben Weisen, die Gnomiker*; Fr. *les Sept Sages (de la Grèce)*; Ital. *i sette Savii*. Thales, Solon, Chilon, Pittacus, Bias, Cleobulus, Periander, Anacharsis (eight for seven).

For the sententious sayings for which they are respectively famous see Eisler, *Wörterb. d. philos. Begriffe*, 'Gnomiker.' (J.M.B.)

Wish. Used for DESIRE (q. v.). (J.M.B.)

Wit [AS. *witt*, knowledge]: Ger. *Witz*; Fr. *esprit*; Ital. *spirito*. The COMIC (q. v.) so far as it turns upon more formal or intellectual relationships and does not excite real interests and emotions.

The wit quality, like that of beauty, includes disinterestedness. Wit, therefore, is more purely AESTHETIC (q. v.), humour less. The intellectual quality is seen in the use of the term for intelligence and mental alertness. (J.M.B.)

Witchcraft [AS. *wicce*, witch, + *cræft*, strength]: Ger. *Zauberei*; Fr. *sorcellerie*; Ital. *stregoneria*. Magical effects of various kinds due to possession, the person possessed being known as a witch. See MAGIC. (J.M.B.)

Of the many aspects of witchcraft—historical, legal, religious, anthropological, psychological, and pathological—only those will be here considered that contribute to an appreciation of its psychological status. In this aspect it presents a widespread belief with many anthropological varieties; it illustrates the

growth of mental epidemics; it illuminates significant stages in the history of culture; and it offers for examination groups of abnormal mental phenomena in which science traces analogies and relations to recognized forms of nervous and mental diseases.

As a practice witchcraft falls under the general head of MAGIC (q. v.), the unusual effects being referred to the actions of charms and potent drugs, of mystical formulae and occult incantations; to strange influences, such as the possession of the evil eye, or to connivance with the supernatural; and in later superstitions to the power gained by compact with the devil and the attendance of imps and familiar spirits. Anthropologically, it finds a widespread representation among primitive peoples in their interpretations of the origin of disease, of the failure of crops, and of every sort of ill fortune that may befall themselves and their belongings. Disease is quite generally regarded as due to the secret machinations of an enemy or to the possession by a spirit, who must be appeased or exorcized. If the crops fail, if the cattle die, if the children fall sick, some one is inflicting these calamities by secret charms or witchcraft. The native Australians do not recognize a natural death, such a calamity being explicable only by bewitchment. Travellers in the Pacific Islands describe a special set of professional disease-makers, who introduce the disease by incantations and spells exercised upon a lock of the desired victim's hair, or a bit of his clothing, or his effigy, or some object which represents him, or even his name. The tortures and maledictions visited upon these are then transferred by a sympathetic magic to the real victim. Hence the dread prevalent among these people of allowing bits of hair, or clothing, or nail-parings to pass into the possession of others. Amongst historical people, from Chaldeans to Anglo-Saxons, beliefs and practices of witchcraft are readily traced in various forms, particularly as influenced by theological conceptions; and these beliefs survive in more or less transparent disguises in current and declining superstitions.

The most important epidemic of witchcraft was that which spread irregularly over Europe mainly in the 16th century. First in Italy and France, then in Germany and England, thousands upon thousands of persons were accused of witchcraft, were tried by bigoted tribunals, were tortured to elicit confessions, and met a horrible death at the stake. The later outbreak of the mania in New England towards the close of the 17th century, though far less extensive, is equally significant. Such suspects were accused of causing sickness and death, and of producing all manner of evils. 'Your grace's subjects pine away even into death; their colour fadeth, their flesh rotteth, their speech is benumbed, their senses are bereft,' says a preacher to Queen Elizabeth. These things were assumed to be possible only by the doings of witches, whom it was a duty to find and destroy. Under this dominant predisposition to see in all things evidences of witchcraft, an elaborate system of beliefs regarding witches grew up; many of the wisest in their lands ignored justice as well as judgment, regarded nothing as too improbable to be admitted as evidence of compact with the evil one, and gave themselves up to a passion for witch-finding, hardly less fervid in its intensity nor less awful in its methods and results than the most bitter religious persecutions. Indeed, both were similarly motived, and are recorded in equally dismal pages of human history. The witches were supposed to have sold their souls to the devil, receiving in return the power to work spells and create diseases; they could change themselves or others into animal forms, and gathered rare herbs and uncouth trifles to prepare magic potions; they were supposed to assemble at night on the witches' sabbath, and then in a mock religious ceremony receive instructions from Satan himself; they were believed to suck the blood of innocent babes, and to indulge in unspeakable forms of sacrilegious and obscene orgies; they could make use of their diabolic powers by flying to these meetings mounted on brooms; their behests were carried out by imps and familiars. So, too, in the tests for witchcraft, the marks of the devil were sought for: the floating test was the most usual. If the witch could float, it was evidence of her witchcraft; if she sank, she died innocent. Pin-pricks located the spots on the body which were insensible to pain, and showed where the touch of the devil had been given. Other more human beliefs utilized as tests consisted in observing whether the witch could repeat the Lord's Prayer, whether it was true that she could weep only three tears, or out of the left eye only, or whether she could prove herself heavier than the Bible. In certain cases, when the hunting of witches was in its decline, the satisfaction of these tests made possible a vindication of the charge. But an equally important, if

not more important, factor in the charges which brought victims to the stake and the scaffold was the imagination and far-fetched accusations of terror-stricken and irresponsible witnesses. Again and again children gave testimony against uncanny old women and were thrown into convulsions in their presence; the most trivial as well as the most outrageous charges were sufficient for condemnation. In German villages one and another testified to having seen the accused in curious garb dance on the green with imps or with the devil transformed in some human guise. The accused was put under torture, and to escape further agony, and half-crazed with fear and pain, confessed to the deeds imputed to her, and often implicated others; and so the flames were kept burning. A list of those beheaded and then burnt, or burnt alive, as witches in the town of Würzburg from 1627–9 records twenty-nine such occasions, and contains the names of one hundred and fifty-one persons. Of these as many were men as women, and thirty were children; all stations of life were represented, though the victims were mostly of the lower classes. The decline of the mania, the gradual assertion of the saner minds in the community, the enlistment of those in high places to suppress the persecutions, the vigorous attacks, usually based on theological argument, upon witch-hunting, the havoc caused by the insecurity of life amongst high and low—these and many other factors contributed to the establishment of more human and enlightened views. Witchcraft declined because of the gradual development of a mode of thought in which the belief found a slighter foothold.

Modern science recognizes in the phenomena of witchcraft many illustrations of nervous and mental symptoms. Quite a large number of the witches accused themselves of imaginary crimes, a common symptom of a type of melancholia, and often connected with religious absorption and a morbid conscientiousness. The readiness with which suggestion acts upon young minds, and induces them to accept as real ideas and actions which they experience only in imagination, is a common principle of modern psychiatry. The contagion of such hallucinatory beliefs is abundantly illustrated in other fields than witchcraft. That many so-called witches gave evidence of 'possession,' and presented the uncontrollable actions and utterings characteristic of hysteria, cannot be doubted. The anaesthetic spots are a frequent hysterical symptom, as is also the extreme suggestibility of the patient. That fear and torture often brought on conditions of irresponsibility and insanity, in which the wildest charges were acknowledged, is also evident. Add to this the ordinary motives of hate and spite and envy and unpopularity, the benighted condition of the masses of the people, the misguided religious fervour, and a considerable portion of the data necessary to a psychological interpretation of the phenomena is at hand.

Literature, general and historical: Lecky, Hist. of Rationalism in Europe, i. chap. i; and art. Witchcraft, in Encyc. Brit. (9th ed.); White, Hist. of Warfare of Sci. with Theol., chaps. xii, xv, xvi; Soldan, Gesch. d. Hexenprocesse (1843; revised by Heppe, 1880); Maury, Hist. de la Magie (1860); Baldi, Hexenprocesse in Deutschland (1874); Janssen, Hexenwesen und Hexenverfolgung, in Gesch. des deutschen Volkes, viii (1892); Haas, Die Hexenprocesse (1865). Anthropological: Tylor, Early Hist. of Mankind. Specially psychological: Snell, Hexenprozesse und Geistesstörung (1891); Beard, Psychol. of Salem Witchcraft (1882). (J.J.)

Wolf (or **Wolff**), **Christian.** (1679–1754.) Attended school at his birthplace, Breslau, Germany, and the universities at Jena and Leipzig. Studied theology, mathematics, and philosophy. Lectured at Leipzig on mathematics and philosophy; professor of mathematics at Halle, 1707; he later lectured in physics and philosophy. He was very successful, but was accused of heresy and ordered by a cabinet to leave Prussia. Lectured for several years at Marburg in Hesse-Cassel; recalled to Halle, 1740; made chancellor of the university, 1743. Died at Halle. See Dogmatism.

Wonder [AS. *wundor*, surprise]: Ger. *Verwunderung, Staunen*; Fr. *étonnement*; Ital. *meraviglia*. That mingled feeling of surprise and awe which arises in view of phenomena that surpass our power and knowledge and which we ascribe to a supernatural or superhuman origin.

Wonder as a religious emotion is largely subjective and passive. It is called forth by the great and mysterious. Greatness alone without mystery would not call it forth. On the other hand, the mysterious alone excites curiosity, but not wonder. Nor would the absolutely mysterious call it forth. It would be simply a bluff to our intelligence. Wonder is the feeling which arises in view of something great about which we have

some knowledge, but whose inner nature we cannot penetrate. Cf. RELIGION (psychology of, also for literature). (A.T.O.)

Woolston, Thomas. (1669–1733.) English divine, born at Northampton; educated at Sidney Sussex College, Cambridge; later a fellow there. Died in prison, into which he was thrown on account of his book on *The Miracles of our Saviour.*

Word [Goth. *waurd*; Teuton. *word*; Lat. *verbum*, word or name]: Ger. *Wort*; Fr. *parole*; Ital. *parola.* In Christian theology: used (1) as an equivalent of the Greek term LOGOS (q. v.); and (2) as a designation of the Old and New Testament Scriptures as the revealed wisdom of God. See also SCRIPTURES, and BIBLE. (A.T.O.)

Word-blindness: see ALEXIA, and BLINDNESS (mental), and cf. SPEECH AND ITS DEFECTS, passim.

Word-deafness: see APHASIA (sensory), and DEAFNESS (mental).

Word Method: Ger. *Wort-Methode*; Fr. (not in use); Ital. *metodo di parola.* An analytic method of learning to read, wherein the word is first taught as a whole, being afterwards analysed into its component letters. Cf. ALPHABET METHOD. (C.DE G.)

Work [AS. *worc*, *werc*]: Ger. *Arbeit*; Fr. *travail*; Ital. *lavoro.* The measure of the energy expended in moving a body or system against the action of a force tending to retard or impede the motion.

If a particle be made to move through a distance p in the direction opposed to a force of intensity f, the work done on the particle is the product pf. In the case of a system, the total work done is the sum of these products formed for each individual particle. The force f may be that of friction, generated when machinery turns, or when a load is dragged over a level floor. In this case the energy expended in doing the work is transformed into the heat produced by the friction. The force may also be that of attraction, as when water is pumped to a higher level. To pump a weight W of water to a height h requires the work Wh. The energy expended in doing the work is then transformed into energy of position, one form of potential energy. If the force f does not act in the direction of the motion, its component in that direction must be used for f. The work is then $pf \cos a$, a being the angle which the direction of the force makes with that of the motion.

It will be seen that work is not a special form of energy, but only an expression for a quantity of energy transformed.

Internal work is the measure, in terms of energy, of a change in the molecular constitution of a body, produced by the expenditure of energy, generally in the form of heat. (S.N.)

Work (in economics): see LABOUR.

Work (mental). (1) The performance of mental functions for the sake of the results attained, as contrasted with PLAY (q. v.).

(2) The effects of mental functions as measured in relative FATIGUE (q. v., also for literature). (J.M.B.)

Works (good, &c., in theology): Ger. *Werke*; Fr. *œuvres*; Ital. *opere.* The actions performed after conversion in obedience to the law or will of God, and either giving the doer merit before God or constituting evidence that he is in a state of grace.

The great opposing tendencies in the sphere of doctrine are embodied in Augustinianism and Pelagianism and their various modifications; the former denying all merit to works except as evidences of grace, the other ascribing merit to works in the procurement of salvation. This latter view rests at the basis of the Roman Catholic doctrines of penance and supererogation. The Augustinian view has dominated Protestant Christianity.

Literature: see PENANCE, PELAGIANISM, AUGUSTINIANISM, and JUSTIFICATION. (A.T.O.)

World [AS. *wer*, man, + *eald*, akin to old, the age of a man, generation]: Ger. *Welt*; Fr. *monde*; Ital. *mondo.* Any sphere or domain of existence, or even of subjective experience, regarded as a relatively self-included whole.

When used without qualification it generally means the physical realm, nature, especially that part which is nearest man—the earth or globe. It is extended, however, to include the whole universe taken as an object; and, when used with qualifying terms, to mean any object or system of objects as material of inquiry, discussion, or reflection; as the world of nature and man, world of art, of spirit: a realm or sphere, whether physical or intellectual, constituting, for the purpose in hand, a single unified content. See COSMOS, MUNDUS, NATURE, and UNIVERSE (2). (J.D.)

World (in theology). (1) The sphere of actuality conceived to be objective to God and including both material and spiritual phenomena.

(2) In the trinity of world, flesh, and devil, the term is applied to the sphere of secular and unspiritual motives.

For the origin of the world see CREATION, and CREATIONISM. The world in its nature is variously conceived. But in every conception of it, it is the sphere of finite existence. The distinction of temporal and spiritual lies within the finite, the spiritual world as well as the temporal being a sphere of manifested and therefore finite reality. In the expression external world we have the analogy of the world as manifested applied to that which in reality transcends it. (A.T.O.)

World-ground: Ger. *Weltgrund*; Fr. *fondement* (or *principe*) *du monde*; Ital. *fondamento dell' universo.* The basis or underlying reality of the world.

The conception is framed with more or less reference to the following motives or demands of thought. (*a*) The world as it presents itself to our immediate perception does not disclose the unity, the permanence, or the purpose which the mind requires for an intelligible account of experience; (*b*) the mind therefore frames a conception of some substance, activity, or principle which it regards as self-existent and ultimate; (*c*) this self-existent, ultimate principle must further be capable of explaining, or affording a SUFFICIENT REASON (q. v.) for, the world as it appears and all its processes and events. Such a ground was sought by Democritus in the atoms; by Plato in the *οὐσία* and especially in the idea of the Good; by Spinoza in Substance; by Leibnitz in the system of monads; by Hegel in the Idea; by Schopenhauer in the Will. As compared with 'cause of the world' the term world-ground (*a*) does not ordinarily involve such a separation as is usually implied by cause; and (*b*) positively implies not merely the external or mechanical relation of efficient cause, but also the more intimate, logical relation of reason.

Literature: SIGWART, Logic; LOTZE, Logic; and Metaphysic; HEGEL, Logic (trans. by Wallace), § 121. (J.H.T.)

World-Soul: Ger. *Weltseele*; Fr. *âme du monde*; Ital. *anima del mondo.* A soul of the world; an intelligent, moving force, or directing and organizing principle, sustaining the same relation to the cosmos as the SOUL (q. v.) or PSYCHE (q. v.) sustains to the rest of the individual; the *anima mundi.*

The conception of such an animating and directing agent, of which the individual soul is a part, is found in early Greek philosophers, especially Heraclitus and Anaxagoras (see LOGOS, and NOUS). It was explicitly designated as soul by Plato (*Timaeus*, 34–7), who attempted to embody in it the opposite principles of unity and plurality, of timeless being and changing process, which he usually contrasted so sharply (see SOCRATIC PHILOSOPHY). It was thus a mediating conception. With the Stoics, similarly, it expressed both the rational and the material character of the universe (see also PNEUMA). It was retained by various scholastics. Abélard rejected the usual interpretation and identified it with the Holy Ghost as the source of spiritual life to individual souls. In more recent times the conception has been employed by Maimon (*Ueber die Weltseele*) and Schelling. The latter means by it 'an organizing principle which makes the world a system.'

Literature: ZELLER, Plato and the Older Academy, 341 ff. (contains bibliog. of the Platonic doctrine); DEUTSCH, Abélard (1883), 284 ff.; FISCHER, Schelling. (J.H.T.)

World-view: suggested rendering of the Ger. *Weltanschauung* (not in use in Fr. and Ital.). The general way of regarding the world, more or less philosophically, personal to this or that individual; thus Emerson's world-view was mystical. (J.M.B.)

Worship [AS. *weorthship*; ME. *worthshipe*, worthiness, dignity]: Ger. *Gottesverehrung*; Fr. *adoration, culte*; Ital. *culto, adorazione.* (1) That prostration which arises in presence of a superior being on whom we are absolutely dependent and whom we fear or reverence.

(2) Acts of worship are those through which the feeling is given expression.

The feeling and act of worship involves primarily submission and fealty. It is the attitude of the weak to the strong on whom they are absolutely dependent. The lower forms of worship are therefore largely motived by abject fear and a desire to propitiate a power which may otherwise be malevolent. It is only in the higher forms of worship that more spiritual and worthy elements enter, such as love, reverence, devotion, gratitude, &c. The form of the ritual indicates as a rule the dominating sentiment of the worship. (A.T.O.)

Worth [AS. *weordh*]: Ger. *Werth*; Fr. *valeur*; Ital. *valore.* (1) A determination which involves any sort of subjective appreciation; equivalent to value.

It will appear from this definition that worth is, in all its forms—hedonic, utilitarian, economic, aesthetic, ethical, social—(*a*) a function of conation: there is no worth but satisfies or stimulates, or embodies some

impulse; and (*b*) relative to some sort of subject.

(2) Used more generally for fitness or adequacy of any kind: as logical, i. e. evidential or argumentative, worth; practical worth, i. e. utility, as of means to an end; symbolic worth, i. e. in terms of meaning, signification, or significance in a whole. (J.M.B.)

The expressions worth and value and their negatives are, in their broadest usage, applied to those contents of consciousness which are selected or rejected on the basis of volitional and affective dispositions rather than because of fulfilment of logical demands or norms. Thus the distinction between 'judgments of value or worth' and 'judgments of matter of fact,' between categories of 'appreciation' and of 'description.'

Historically, the distinction attained its present importance through the Kantian dualism between the theoretical and practical reason, according to which judgments of value spring from *a priori* volitional norms distinct from the norms of pure reason. With the exception of the theory of value developed by Hegelian idealism, this distinction has had a relatively constant place in post-Kantian thought. Herbart and Lotze especially emphasized it by the development of the theory that emotional congruity rather than logical consistency is the determining element in judgments of value.

Popular usage would suggest that this distinction is not ultimate, but rather one which has meaning merely for philosophical methodology. Thus the expression value is used to describe all purposive relations of thought, whether in the most abstract realm of mathematics or in the sphere of practical utilities. Recent important contributions to philosophy have sought to point out the relativity of this distinction. Ormond (*Foundations of Knowledge*) devotes a chapter to the relations of 'judgments of truth and value,' and Royce (*The World and the Individual*) has developed fully the importance of this relative distinction within a monistic idealism. Cf. Origin *versus* Nature.

This philosophical distinction has proved fruitful in developing a distinctively scientific study of values. Out of the investigations of the psychological basis of economic values by the subjective school of economists (see Economic Science) had arisen the need for a more general analysis of values. To the origination of this new field of study, Brentano (*Psychologie vom empirischen Standpunkte*) largely contributed by a doctrine of psychological dualism which reduced all judgments of value to a fundamental faculty of love and hate. From these sources have developed the psychological theories of value of Meinong and Ehrenfels. This school has definitely formulated the problems of a science of values and made some important contributions towards their solution.

The nature of worth and value. Worths, as constituting a problem for empirical analysis, are to be deduced neither from external utilities nor from nativistically conceived needs or instincts of the subject (Nietsche). Worth defines an attribute neither of subject nor of object, but rather a functional relation between the two. All values are therefore descriptive of such actual or possible relations (Meinong, as cited below, 29; Ehrenfels, as cited below, 65). As to the psychological nature of this relation there is some difference of opinion. Is the process of valuation identical with desire (Ehrenfels), or is the sense of value given in feelings of worth (Werthgefühle), following upon judgmental processes involving the recognition of the existence or non-existence of objects (Meinong)? If of the former character, then the sense of value is measured in terms of the strength of desire, and the strength of desire is determined by the relative increase of pleasure involved. If of the latter nature, then the sense of value is given in modifications of feeling, determined by the existence or non-existence of objects for conative tendencies, or for judgment. It is probable that, while worth is a function of the relation of desire to its object, all immediate sense of value is given in affective states resultant upon the affirmation or inhibition of conative tendencies, for the intensity of desire cannot be measured directly.

Since value is a function of desire or judgment, expressing a relation between subject and object, desire or judgment presuppose dispositional tendencies. If, as according to Ehrenfels, value is a function of desire, and desire is determined by the relative increase of pleasure that results, then affective dispositions are presupposed. If, however, the sense of value is given in modifications of feelings, determined by volitional, judgmental reactions, then volitional dispositions are assumed.

The dispositional concept. In either case the dispositional concept is of great importance in modern theories of value. For, in

the first place, value being a function of the relation of these dispositions to objects, these dispositions, the product alike of individual and social causal processes, are the determinants of the sense of value. All these analysts of the sense of value agree that it cannot be reduced to conscious calculation of pleasures and pains. In the second place, upon the modifications of these dispositions, affective or volitional, depend the mutations of value, and from the laws of their modification spring the empirical laws governing mutations of value in the individual and social consciousness.

In connection with this dispositional concept arises a psychological question of importance (see DISPOSITION). Does it represent a psychological reality, or is it only a way of expressing possibilities and probabilities of worth reactions? Is it of purely physiological significance? Meinong (as cited below, 173) and Ehrenfels (as cited below, 117) conceive it rather in this fashion, denying a corresponding psychological reality. It is, however, worth while noting in this connection that certain other theories of value (Guyau, Krueger) seem to presuppose a development of conscious affective dispositions in the direction of a generalization of affective states, and that such a theory of generalization would make of the dispositional concept a term much more capable of explaining the subjective phenomena of valuation. The relation of desire and conation in general to affective states and the nature of affective or conative dispositions are then among the most important psychological problems of a theory of value. Ehrenfels, indeed, insists at length, and probably with justification, that the question whether value springs from affective or conative dispositions has little influence upon the determination of the empirical laws of value which reflect the modifications and mutations of these dispositions. In fact, he points out in detail the slight changes necessary to make these laws harmonize with either theory. The important problem is rather whether all values and their modifications may be reduced to modifications of these dispositions, whether all values are dispositional values in this monistic sense, and whether the laws governing the mutations of value hold for all values. Opposed to this is the dualistic conception of Schwartz that there are two classes of values—values of 'condition,' determined by desire and feeling, and higher values of the person and the race, determined by *a priori* functions of the will—a dualism which seems to rest upon a defective analysis of the consciousness of value. It is probable that the highest ethical values are dispositional, refined and specified by the growth of intelligence, by the specification and abstraction of the social consciousness.

Ethical values. Within the general theory of value, based upon the facts of psychological analysis, may be distinguished the special provinces of economic and ethical values. The former develops the laws governing the material instrumental values, the latter the instrumental values (Wirkungswerthe), of human dispositions, in the sense defined, for society.

Intrinsic and instrumental values. Empirical analysis, however, discloses the fact that dispositions are valued both as intrinsic and instrumental values (Eigen- and Wirkungswerthe). What is the genetic relation of these two classes? Are the intrinsic values original, underived dispositions, valued independently of their instrumental value, of their effects, or are they genetically related to instrumental values? The monistic theories recognize this genetic relation. While it is certain that dispositions are valued as intrinsic without reference to their effects, nevertheless psychological analysis discloses laws according to which instrumental values are constantly passing over into intrinsic and intrinsic into instrumental. This process is called value movement (Werthbewegung).

Laws of value movement. It is Ehrenfels' special service (Meinong, as cited below, 72) to have formulated the laws of this movement. There is, in the first place, a mutation of values due to the modification of these dispositions by well-known laws of individual and social psychology, such as habit, association, transference of feeling, and suggestion. In the second place, there is a progressive derivation and subordination of values, growing out of the development of the intelligence and powers of abstraction. The tracing out of teleological and causal dependencies of values leads to the valuation of dispositions as intrinsic instead of instrumental values, and reversely, as instrumental instead of intrinsic. There is likewise a movement from the valuing of external acts to inner dispositions, these dispositions becoming bonds of retention (Erhaltungs-Glieder) for adaptive reactions. These laws of value movement and the lapsing from consciousness of intermediate values are also studied by Schwartz and Simmel.

The question arises, whether a fundamental class of intrinsic values can be distinguished. It is clear that only psychical dispositions are intrinsic values, and, in view of the fact of the mutation of values, only the most general classification is possible. A threefold classification into values of 'condition,' 'personal' and 'over-individual' values has been made, but Schwartz's attempt to make this distinction absolute is probably unwarranted. Intrinsic as well as instrumental values suffer mutation (Meinong, as cited below, 72; Ehrenfels, as cited below, 112).

The empirical laws governing the mutations of value are laws both of the individual and social consciousness. Values may thus be individually or successively, ontogenetically or phylogenetically, developed. The struggle for existence among dispositions, which are at once the objects of ethical valuation and the source of value reactions, springs out of the nervous conditions of these dispositions. While there dwells in each the tendency to utmost activity under the given conditions, yet, since the valuing subject is master of only a limited energy of valuation, i.e. nervous energy, the increase of value of any given disposition must necessarily cause others to decrease. In any case increase of value is always relative.

The measurement of value. Consequently both Meinong and Ehrenfels conceive that the law of marginal utility, which has been developed for economic values, holds also for ethical instrumental values. It is a fundamental law of all valuation. In its application to the ethical sphere it has been called the law of Grenzfrommen. And, since there are no absolutely underived values, but all are either individually or successively, ontogenetically or phylogenetically, derived and have become the 'bond of retention' for extrinsic values, it follows that the law is conceived to govern intrinsic values also. The working of this law in the sphere of social ethical worths gives rise to a constant value movement which manifests itself in the creation of three grades of value always distinguishable at any empirical stage of the movement. These are described as aspiring, normal, and outlived (aufstrebende, normale, and entfrommte), and correspond to the changes in dispositions. This is called the ethical value movement.

Distinction between ethical and moral values. Both of these writers give to the moral values a sort of central position in the entire sphere of ethical human values. Moral values are those dispositions which, in the social ethical value movement, have been segregated as relatively permanent intrinsic values. Thus Ehrenfels conceives, arising partly out of the ethical value movement described above, a second moral value movement, which may be defined as a tendency to the valuation of *activities* as such, which have their 'bond of retention' in their utility for the general welfare. This segregation of a central sphere of relatively permanent good and bad activities is the product of growing powers of abstraction and of the impersonal participation of the individual in the social value consciousness. In view of this distinction between ethical and moral values it becomes clear how a relative permanence of moral concepts is consistent with mutations in ethical values. Dispositions change more rapidly than the social valuation of abstract activities. The moral movement is an integrating movement within a wider ethical development.

Absolute values. In this connection arises the question of the existence of absolute values and of a single dispositional value corresponding to a single immanental end of the ethical movement. The logical consequence of the methodological principles described is a negative answer, entirely in line with the critical conclusions of such writers as Simmel and Münsterberg. Since all values are dispositional values, and dispositions are subject to the empirical laws of mutation, it follows that neither in the individual nor in the social consciousness can a value be in any sense absolute. It follows also that a single affective disposition, corresponding to a single ethical end, is psychologically inconceivable. Such monistic formulations of the ethical end as the 'general welfare,' 'self-realization,' 'highest possible energy of valuation,' can only be understood as regulative concepts brought in from an external philosophical speculation.

The more philosophical problems of a theory of value arise when the attempt is made to connect the empirical laws of value, determined by psychological analysis, with the more general conceptions of science and philosophy. The psychological analysis of value makes an artificial abstraction of the affective, volitional aspects of consciousness. A more general theory of value seeks to correlate anew these abstracted processes, scientifically, with the biological processes (Ehrenfels),

philosophically with the rational processes of the self.

In connection with the latter arise such questions as (*a*) the relation of the individual to the social value series; (*b*) the significance of the worth postulates of the self and their relation to the causal mutations of values; and (*c*) the harmonization of the idealistic measure of value, in 'extension and intension' (Bradley, Guyau, Krueger), with the empirical measure, developed above. Since value expresses a relation between subject and object in the last analysis, it becomes a problem for epistemology and metaphysics.

Literature: Meinong, Psychologisch-ethische Untersuch. zur Werththeorie (1894); Ehrenfels, Syst. d. Werththeorie (1897); and Werththeorie und Ethik, Vtljsch. f. wiss. Philos. (1893); critical study of these writers, Mackenzie, Mind, Oct., 1899; Schwartz, Psychol. des Willens, and Zur Grundlegung d. Ethik (1900); Krueger, Der Begriff des Absolut-Werthvollen als Grundbegriff d. Moralphilos.; Simmel, Einleitung in die Moralwiss.; Münsterberg, Der Ursprung d. Sittlichkeit; Patten, Economic Causes of Moral Progress, in Ann. Amer. Acad. Pol. and Soc. Sci.; Nietzsche, Zur Genealogie d. Moral; Guyau, Esquisse d'une Morale sans Obligation ni Sanction; Bradley, Ethical Studies; Mackenzie, Introd. to Social Philos.; Tarde, La Logique sociale; Urban, The Problem of a Logic of the Emotions and Affective Memory, Psychol. Rev., 1901; The Consciousness of Value, Psychol. Rev., Monog. Suppl., 1902; and The Relation of the Individual to the Social Value Series, Philos. Rev., 1902; Höfler, Psychologie (1897).

(W.M.U.)

Wrath [AS. *wradh*]: Ger. *Zorn*; Fr. *courroux*; Ital. *cruccio*. Moral Anger (q. v.), which is in some degree justified, and which is entertained by one of superior or exalted nature or station; called also *ire* (as in the case of God), and righteous anger (as in the case of the Hebrew prophets). (J.M.B., G.F.S.)

Wright, Chauncey. (1830–75.) An American writer on science and philosophy, born at Northampton, Mass. His writing was mainly in the form of papers in current journals—collected in certain of them are his *Philosophical Papers* (ed. by Norton). He held no academic post, but lectured in 1875 on psychology at Harvard University. He died at Cambridge, Mass., where much of his life was spent.

Writer's Cramp: Ger. *Schreibkrampf*; Fr. *crampe des écrivains*; Ital. *granchio degli scrivani, mogigrafia* (E.M.). A characteristic professional or occupation neurosis affecting those who have overstrained the neuromuscular mechanism of writing.

As a rule no other co-ordinations are affected than those involved in writing, the patient being able to use a razor or needle, to perform on a musical instrument, and the like. Every attempt to write, however, brings on a cramp; and although the attempt is made to hold the pen in a new position, and other devices are resorted to, the desired movements fail to be executed. In severe cases other delicate movements are also involved, and slight tremors, neuralgic pains, and much mental distress form accompanying symptoms. Analogous professional neuroses are piano-player's, violinist's, telegraphist's, auctioneer's cramp, &c. See Bernhardt, 'Die Erkrankung der peripherischen Nerven,' in *Nothnagel's Spec. Pathol. u. Therapie* (1897), 160 ff. (J.J.)

Writing: see Handwriting.

Wrong [AS. *wrang*]: Ger. *Unrecht*; Fr. *mal*; Ital. *torto*. The violation of that which constitutes right, or a right, constitutes wrong, or a wrong. See Right (various topics). (J.M.B.)

Wrong (in law): Ger. *Verletzung, Unrecht*; Fr. *injustice, délit*; Ital. *ingiusto, ingiustizia*. An invasion of another's right, causing him damage or breaking the peace of the state.

The term is broader than Tort (q. v.). It covers violations of contract and public wrongs (those breaking the peace of the state), i.e. crimes (see Holland, *Jurisprudence*, chap. xiii. 281). It involves the notion of culpability. He is blameworthy who fails to fulfil his contract obligations; and he also who acts in such a way as naturally, though undesignedly, to damage another, when a person of ordinary intelligence ought to foresee the consequence (Holmes, *The Common Law*, 108). A narrower meaning has been assigned to 'injury' (Puffendorf, *De Officio Hominis et Civis*, Lib. I. chap. ii. 15). Courts are for the redress of wrongs, and only act in exceptional cases for their prevention, as by an injunction against a threatened wrong (Markby, *Elements of Law*, chap. xx. § 852). (S.E.B.)

X

XENIA — XENOPHANES

Xenia [Gr. *ξένια*, gifts to a guest from his host]: Ger. *Xenien*; Fr. *xénies*; Ital. *xenia*. The influence of pollen of one species upon the maternal tissues of another species after hybrid fertilization. Cf. TELEGONY.

The term was introduced by W. O. Focke, 1881. Cf. Delage, *L'Hérédité*, 233. (C.S.M.)

Xenocrates. (396–314 B.C.) Born at Chalcedon; a pupil of Plato, whom he accompanied to Syracuse. After the master's death he went with Aristotle to Asia Minor. Returned to Athens and succeeded Speusippus as head of the Academy.

Xenophanes of Colophon. Lived in the 6th century B.C. He is distinguished as the first Greek monotheist and founder of the Eleatic School, named after Elea, in Lower Italy, where the philosopher finally settled. See PRE-SOCRATIC PHILOSOPHY (Eleatics).

Y

YOGA PHILOSOPHY — YOUTH

Yoga Philosophy: see ORIENTAL PHILOSOPHY (India).

Youth: see ADOLESCENCE.

Z

ZEISING'S PRINCIPLE — ZENO

Zeising's Principle: see GOLDEN SECTION.

Zend-Avesta: Ger. *Zend-Avesta*; Fr. *Zend-Avesta*; Ital. *Zend-Avesta*. The ancient Bible of the Zoroastrians, composed of a fragment of the works accredited to Zoroaster and constituting, in connection with the Pahlavi books, the sacred literature of the Parsees.

The surviving fragment of the Avesta forms about one-third of the original ascribed to Zoroaster, which is said to have been burned at the time of the Alexandrian conquest. The surviving part is about one-tenth the size of the Christian Bible. See ZOROASTRIANISM.

Literature: GELDNER, Text of the Avesta (1884); DARMESTETER and MILLS, Zend-Avesta (Eng. trans., 1880–7); Oriental Religions Series, iv, xxiii, xxxi. (A.T.O.)

Zeno of Elea. (Early in the 5th century B.C.) Son of Teleutagoras, he became the pupil and friend of Parmenides. He is called by Aristotle the inventor of dialectic. See PRE-SOCRATIC PHILOSOPHY (Eleatics), and cf. SOPHISM.

Zeno is the author of the sophism called the 'Achilles argument,' to prove that motion is impossible; i.e. Achilles, the fastest possible runner, could never overtake the tortoise, the slowest possible goer, if the latter had ever so short a start; for the distance between them consists of an infinite series of parts, and when Achilles, by traversing one of these parts, comes to where the tortoise was, the latter will always have gone further. Cf. SPACE (passim).

Zeno the Stoic. (b. cir. 340 B.C.) A merchant until his thirtieth year, he was led, as a result of shipwreck, to visit Athens.

Read the works of Xenophon and Plato; admired Socrates; became a disciple of Crates the cynic, then of Stilpo of the school of Megara, and of Xenocrates and Polemon in the Academy. About 310 B.C. he founded a school in the Στοὰ ποικίλη (hence 'Stoic'), and after fifty-eight years of teaching committed suicide.

Zone [Gr. ζώνη, a girdle]: Ger. *Zone*; Fr. *zone*; Ital. *zona*. An area or region; e.g. the motor zone or area of the brain; the language zone or general area within which anatomical injury leads to disorders of speech. The retina may be divided into zones, and in disorders of vision sight may be defective in certain limited zones.

In hysteria there are characteristic hysterogenic zones, pressure upon which produces not only pain but a convulsive attack (see Hysteria). Zones as well as spots of anaesthesia and of hyperaesthesia are found in hysteria and other nervous disorders. (J.J.)

Zones of His: Ger. *Längszonen von His*; Fr. *zones de His*; Ital. *zone di His*. The four longitudinal thickenings of the central nervous system.

The two dorsal zones are especially associated with the entering sensory nerves. The two ventral zones contain all the nerve-cells whose axons form ventral or lateral nerve-roots.

W. His was the first to recognize the morphological significance of these zones, which dominate the structure of the nervous system. He termed the ventral zones Grundplatten, the dorsal zones Flügelplatten. The present term was introduced by Minot, *Human Embryol.* (1892). (C.S.M.)

Zoology: see Biological Sciences.

Zootheism [Gr. ζῷον, animal, + θεός, God]: Ger. *Zootheismus*; Fr. *zoothéisme*; Ital. *zooteismo*. The representation and worship of deity under the form of an animal, the animal being regarded not as the symbol of the deity, but as actually inhabited by him.

The later stages of zootheism are seen in the Egyptian reverence for animals, in which, however, the animal has become largely symbolic. The crude form of zootheism is supposed to represent the lowest and most primitive form of religious belief.

Literature: Andrew Lang, art. Religion, in Encyc. Brit. (9th ed.). (A.T.O.)

Zoroaster. One of the great teachers of the East, the prophet of Iran, whose teachings are contained in the Avesta. The dates of his life are unknown; the ancient authorities differ as widely as 5,000 years as to his birth. He probably taught in Eastern Iran, especially in Bactria. Probably he began teaching at thirty, and was slain in battle at seventy years of age. He is regarded as one of the Magi, and the author of a new creed. Zoroastrianism was the national religion of ancient Persia until Alexander the Great invaded the country, and again until the rise of Mohammedanism. See Zoroastrianism, and Oriental Philosophy (Persia).

Zoroastrianism [Pers. *Zorothustra*]: Ger. *Lehre von Zoroaster*; Fr. *Zoroastrisme*; Ital. *Zoroastrismo*. The religious system of the Persians, founded by Zoroaster and involving a dualistic struggle between the powers of light and darkness personified in the good and evil deities Ormuzd and Ahriman and their attendant devs or spirits. See Oriental Philosophy (Persia).

Zoroastrianism is mistakenly called fire-worship, inasmuch as fire is used only as a symbol of the good spirit. The dualism, though personified in two opposing deities, is not absolute, for the evil deity, while coeval with Ormuzd, will be finally destroyed. Man was created with free will, and his struggle may end in final triumph over evil. The power of Zoroastrianism was broken by the Alexandrian invasion and was further shattered by the rise of Mohammedanism. It is now the religion of about 90,000 Parsees.

Literature: see references under Zend-Avesta; also A. Hovelacque, Le Avesta, Zoroastre, &c. (1880); W. Geiger, Ostiranische Kultur im Alterthum (1882). (A.T.O.)

Zwingli, Ulrich or **Huldereich.** (1484–1531.) Studied at Wesen, Vienna, and Basel. Ordained priest, and elected pastor of Glarus, 1506; called in 1516 to St. Mary's at Einsiedeln; also in 1518 to the cathedral at Zürich, where he remained until his death; introduced the Reformation movement into Zürich, 1524; led the movement in other Swiss cantons; took part in the conference at Berne, 1528, where the mass was abolished. Killed in a battle between the Roman Catholic and Protestant cantons while stooping to minister to a wounded soldier. One of the most influential leaders of the Reformation (q. v.).

GENERAL INDEXES

I. INDEX OF GREEK TERMS

[This Index and that of Latin terms were prepared by Professor W. M. Urban.]

The reference numbers are printed in four different kinds of type: those in black type (**123**) are terms which occur as main topics in the work; those in modern face type (123) are the formally recommended equivalents; those in italic (*123*) are terms of which some exposition or discussion is given; and those in old style (123) are those which have passing mention only, but which are mentioned in a way judged of sufficient importance to require citation.

Under each kind of type the citations from vol. ii follow those from vol. i, and are preceded by the Roman numeral ii (which is not repeated); all other citations are from vol. i.

With the page number the column of the page is given in a small figure; where the small figure is omitted the reference is to both columns.

ἅδης, **436**[1], 465[2].
ἀδιάφορα, 427[1], 533[1], ii. 475[1].
ἀδιάφορον, ii. *430*[2].
αἰδώς, ii. 672[2].
αἴσθησις, ii. 131[1], 205[1].
αἰσθητόν, ii. 185[1].
αἴτιον, 164[2], 165[1].
ἀκρασία, 575[1].
ἀλήθεια, *430*[2], 429[2], ii. 205[1], 717[2].
ἁμαρτία, 434[2], ii. 717[2].
ἄμεσα, *430*[2].
ἀναγκαιοτάτη πόλις, ii. 596[2].
ἀνάγκη, *430*[2], 298[2], 429[2], 500[2], ii. 45[2], 144[2].
ἀναλογία, 41, ii. 639[2].
ἀναλυτικός, 427[2].
ἀνδρεία, 393[2], ii. 764[1].
ἀξίωμα, 97[2].
ἀορίστη, ii. 147[2].
ἀπαγωγή, ii. 427[1], 434[2].
ἄπειρον, **57**[2], *430*[2], 423[1], 429.
ἀπόδοσις (apodosis), ii. 181[1].
ἀπορία, 554[1].
ἀπορροαί, ii. 278[1].
ἀρετή, 335[2], 350[2], ii. 279[1], 549[2].
ἀρχή, **66**[2], 165, ii. 50[2], 425[1], 612[2].
ἄτομον, 537[1].
αὐτό, **93**[1].
αὐτὸ ἀγαθόν, 417[1].
αὐτοκράτωρ, 93[1].
αὐτόματον, 50[1], 94[1], 298[2].
ἀφαίρεσις, 5[1].

Γέεννα, 465[2].
γένεσις, **409**[2], 302[2], 173[1].
γενναῖον ψεῦδος, ii. 761[1].
γένος, *430*[2], 424[2], 425[2], ii. 325[1].
γίγνεσθαι, 173[1].
γιγνόμενα, ii. 421[1], 446[1], 602[2].
γιγνώσκειν, *430*[2], 428[2].
γνῶσις, **414**[2], 19[2], ii. 269[1]; 369[2], ii. 269[2], 301[2].
γυνή, 406[1].

δημιουργός, ii. 551[1].
διάθεσις, ii. 329[2]; *430*[2], 425[2], 552[2].
διαιρεῖσθαι, *430*[2].
διακρίνεσθαι, 24[1].
διαλεκτικός, *430*[2], 427[2].
διάλλαξις, 424[1].
διάλληλον, ii. 663[1].
διάνοια, ii. 185[2], 205[1], 425[2], 725[2].
διάρθρωσις, ii. 218[2].
διάφορα, ii. 325[1].
δικαιοσύνη, 764[1].
δίκη, ii. 196[1], 335[1].
δόξα, ii. 204[2], 205[1], 725[2].
δύναμις, **300**[2], *430*[2], 12[2], 425[2], ii. 131[2], 313[2], 317[2], 319[1], 402[1], 421[1].

ἔθος, 346[1], 347[2].
εἰδέναι, 602[2].
εἶδος, 165, *430*[2], 424[2], 425[2], ii. 281[2], 325[1], 342[1], 407[2], 421[1], 440[2], 441[2].
εἴδωλον, **312**[2], ii. 221[2], 278[1].
εἰκασία, ii. 205[1].
εἶναι, *430*[2], 428[2].
ἕκθεσις, ii. 695[1].
ἔκστασις, ii. 374[2].
ἔλεγχος, **313**[2], ii. 181[1].
ἐμπειρία, ii. 132[1].
ἐνέργεια, **324**[2], 13, *430*[2], 350[2], 425[2], ii. 196[1], 317[2], 401[2], 421[1], 764[1].
ἓν καὶ πᾶν, **326**[2], ii. 742[1].
ἐντελέχεια, **327**[1], ii. 375[2], 313[2], 319[2], 421[1], 446[1], 613[1].
ἕξις, *430*[2], ii. 140[2], 329[2], 764[1].
ἐπαγωγή, 539[2].
ἔπεα πτερόεντα, ii. 449[2].
ἐπιθυμία, ii. 196[1].
ἐπιστήμη, ii. 131[2], 185[2], 204[2], 321[1], 425[2], 725[2].
ἑπόμενον, 165[1].
ἐποχή, ii. 405[1].
ἔρως, **340**[1].
ἑτεροουσία, 67[1], 484[2].
εὐδαιμονία, **350**[2], 334[2], 350[1], 322[2], 441[1], ii. 196[1], 813[1].
εὖ ζῆν, ii. 813[1].
εὐσχημοσύνη, 391[1].
ἔχειν, ii. 315[2].

ζῶον, ii. 140[2], 218[2].

ἡδονή, 350[2].
ἠθική, ii. 594[1].
ἦθος, 346[1], 349[1], ii. 268[1].

θεμα (thema), ii. **691**[2].
θεοῦ βίαν, 12[1].
θεωρία, ii. 568[2], 807[2].
θιγεῖν, 63[1].
θυμός, *430*[2], ii. 196[1], 375[1], 474[2].

ἰδέα, ii. 721[1].
ἴδιον, ii. 325[1].
ἰσοδυναμῶν, 338[1].

καθ' αὐτόν, 595[2], 281[1].
κάθαρσις, **161**[2], 70[2], ii. 709[2].
καθῆκον, ii. 196[1].
καλοκαγαθία, 104[2], 485[2].
κανών, **152**[2], 92[2], 116[1], 41[2].
κατηγόρημα, 159[2], ii. 325[2].
κατόρθωμα, ii. 196[1].
κατ' οὐσίαν, 173[1].
κενόν, ii. 561[2].
κένωμα, ii. 305[2].
κένωσις, 599[1].
κίνησις, **601**[1], ii. 85[2], 315[2], 699[2].
κλῖμαξ, ii. 714[1].
κοιναὶ ἔννοιαι, ii. 740[1].
κοινόν, ii. 316[1].
κοινὸν αἰσθητήριον, 430[2].
κοινωνία, ii. 263[2].
κόσμιος, 105[2].
κόσμος, 173[2], 238[1], 105[1].
κόσμος νοητός, ii. 179[1].

λῆμμα, ii. **3**[1].
λογισμός, ii. 132[1], 560[1].

λόγος, ii. **30**[2] ; 67[1], 578[1], ii. 498[1], 514[1], 375[2], 821[1], 822[1] ; *430*[2], 32[2], 165[1], 302[2], 408[1], 427[1], 593[1], ii. 59[2], 131[1], 140[2], 71[1], 196[1], 257[1], 335[1], 336[2], 425, 585[1], 691[2], 628[2], 818[2].
λόγος σπερματικός, ii. 514[1].

μέθεξις, 263[2].
μέλος, ii. 218[2].
μέρος, ii. 218[2].
μέσον, ii. 56[2].
μεσότης, ii. 764[1].
μεταβολή, 171[2], 173[1].
μίξις, 424[1].

νόησις, ii. 551[2], 725[2].
νοητόν, ii. 185[1].
νόμος, ii. 196[1].
νούμενον, ii. **184**[2], 7[1], 289[1], 514[1] ; *598*[1], 594[2], 595[2], 596[1], 598[1].
νοῦς, ii. **185**[2] ; 430[2], ii. 179[1], 139[2], 140[2], 336[1], 375[2], 557[2], 585[1], 725[2], 822[1] ; 57[2], 106[1], 428[2], 593[1], ii. 184[2], 201[2], 257[1], 82[2], 144[2], 425[2], 663[2], 667[1], 689[1], 818[2].
νοῦς ποιητικός (παθητικός), ii. 186[1].

ὁμοιομέρειαι, **483**[2].
ὁμοιουσία, **483**[2], ii. 484[2].
ὁμοουσία, **484**[2], ii. 614[1] ; 67[1], 483[2], 484[2].
ὄνομα, ii. 607[2].
ὄντα, ii. 289[1], 421[1].
ὀξύς, 105[2].
ὄργανον, ii. **219**[1], 266[2], 325[1].
ὄρεξις, 430[2].
οὐσία, *430*[2], 422[2], ii. 203[2], 375[1], 421[1], 551[1], 607[2], 612[2], 613[1], 614[1], 639[1], 822[1].

παθεῖν, ii. 616[1].
πάθη, 22[1], 57[2], ii. 267[1].
πάθος, ii. **208**[1].
πανδεχές, ii. 747[2].
παρά, ii. **258**[1].
παράδειγμα, 41[2].
παράπτωμα, 434[2].
παραφυάς, 501[1].
παρουσία, ii. **263**[2].
πάσχον, 166[1].
περίτρατος, ii. 280[1].
περὶ ὕψους, ii. 611[2].
πίστις (pistis), 369[2], 414[2], ii. 269[2], 301[2].
πνεῦμα, ii. **307**[2], 308[1], 375[2], 498[1], 557[2], 585[1] ; *430*[2], 116[1], 593[1], 427[1], ii. 34[1], 82[2], 715[1].
ποιεῖν, 13[2], ii. 293[2], 407[2].
πολιτική, ii. 594[1].
πρᾶξις, ii. 321[1].
πρόληψις, ii. **359**[1], 56[1].
πρόσθεσις, 5[1].
προσῳδία, 7[1].
πρότασις, ii. **371**[1], 181[1].
πρότερον, *430*[2], ii. 315[2].
πρώτη ὕλη, 501[1].
πῦρ, *430*[2].
πῦρ ἀεὶ ζωόν, 423[2].

ῥῆμα (rhema), ii. 146[2], 447[2], 531[2], 607[2].
ῥητός, ii. 415[1].

σάρξ, 124[1].
σοφία, ii. 764[1], 818[1].
στερητικός, ii. 343[2].
στοά (stoa), ii. 603[2].
συλλογίζεσθαι, ii. 629[1].
συλλογισμός, ii. 639[2].
συμβαῖνον, 165[1].
συμβεβηκός, 90[1], 501[1], ii. 325[1], 613[2].
σύμβολον, ii. 640[1].
συμμίσγεσθαι, 424[1].
συν (syn-), ii. **654**[1].
συνείδησις, ii. 656[1].
συνκατάθεσις (synkatathesis), ii. **658**[1].
συντήρησις (synteresis), ii. **655**[2].
σύστημα, ii. 218[2].
σχήματα (schema, schemata), ii. **490**[2], 490[2].
σῶμα (soma), ii. **554**[2] ; 412[2], ii. 139[2], 715[1].
σῶμα ψυχικόν (πνευματικόν), 124[1].
σωφροσύνη, ii. 672[2], 764[1].

τὰ ἄκρα, ii. 37[1].
τὰ καθ' ἕκαστα, 537[2].
Τάρταρος, 465[2].
τέλος, 165[1], 322[2], ii. 666[2].
τέμνειν, *430*[2], 424[2].
τέχνη, 41[2], ii. 185[2], 321[1], 725[2].
τῇ φύσει ζῆν, ii. 196[1].
τὸ δὲ γίνεσθαι καὶ ἀπόλλυσθαι, 424[1].
τὸ δέον, 301[2].
τὸ δυνατόν, *430*[2], 429[2].
τὸ ἐνδεχόμενον, *430*[2], 429[2].
τὸ ἐξ ἀνάγκης, 501[1].
τὸ ἡγεμονικόν, ii. 34[2].
τὸ καθῆκον, 301[1].
τὸ καλόν, 104[2].
τὸ κενόν, ii. 747[2].
τὸ μὴ ὄν, 501[1].
τὸ ὅλον, 4[1].
τὸ οὗ ἕνεκα, 501[1].
τὸ οὗ οὐκ ἄνευ, 501[1].
τὸ πᾶν, 33[2].
τὸ πέρας, *430*[2].
τόπος, ii. 59[2], 561[2].
τόπος νοητός, ii. 179[1].
τὸ ποιόν, *430*[2], 427[2].
τὸ πρός τί πως ἔχον, *430*[2].
τό πως ἔχον, *430*[2].
τὸ τέλειον, 4[1].
τὸ ὑποκείμενον, *430*[2], 427[2].
τύχη, 7[2], 171[2], 298[2], ii. 144[2].

ὕλη, **489**[1], 165[1], 298[2], ii. 50[2], 342[1], 343[1], 421[1], 552[2], 607[2], 613[1].
ὑπό, **491**[1].
ὑποδοχή, ii. 560[1].
ὑποκείμενον, ii. 607[2], 612[1].
ὑπόστασις (hypostasis), **491**[2], ii. **613**[2], 439[1], *639*[1].
ὕστερον πρότερον, **497**[2], 373[1].

φαινόμενον, ii. **289**[1] ; 61[1], 360[2], ii. 185[2], 514[1] ; *598*[1], 27[1], 594[2].
φαντασία, *430*[2], 430[1], 517[1], ii. 385[1].
φθορά, 173[1].
φρένες, 436[2].
φρόνησις, ii. 205[2], 765[1], 818[1].
φυσικός, *430*[2], 425[1], ii. 300[1].
φύσις, *430*[2], 424[1], 429[1], ii. 139[2], 300[1], 336[1], 375[1], 667[1].

ψευδής, ii. 717[2].
ψυχή, ii. **374**[2], 335[1], 498[1], 549[2], 550[2], 557[2], 585[2] ; 116, ii. 140[2], 557[2], 715[1].

II. INDEX OF LATIN TERMS

[The Greek equivalents, given in the Greek Index, may supply apparent omissions from this list.]

The reference numbers are printed in four different kinds of type: those in black type (**123**) are terms which occur as main topics in the work; those in modern face type (123) are the formally recommended equivalents; those in italic (*123*) are terms of which some exposition or discussion is given; and those in old style (123) are terms which have passing mention only, but which are mentioned in a way judged of sufficient importance to require citation.

Under each kind of type the citations from vol. ii follow those from vol. i, and are preceded by the Roman numeral ii (which is not repeated); all other citations are from vol. i.

With the page number the column of the page is given in a small figure; where the small figure is omitted the reference is to both columns.

abacus, **1**[1], ii. 29[1].
absolutus, *639*[1].
accentus, 7[1].
accidens, per accidens, *639*[1].
Acro, **11**[1].
actio, 561[1], ii. 293[2].
actio ad distans, **12**[1], 13[1], 421[2].
actio immanens, transiens, ii. 712[1].
actiones arbitrariae, 65[1].
actor, 352[1].
actor sequitur forum rei, 394[1].
actualitas, *639*[1].
actus, **14**[2], *639*[1], ii. 590[1].
actus dei, 12[1].
actus purus, 13[2], ii. 401[2].
ad esse, ad bene esse, ii. 145[2].
adiaphora, **16**[1].
Adrastus, **19**[1].
aequivocum, ii. 590[1].
aesthetica, 584[1].
aevum, ii. 700[2].
affectiones, 22[1].
affectus, 22[1].
affirmatio, *639*[1].
a fortiori, **23**[2], ii. 22[1].
alter, **35**[1], 35[2], ii. 548[2], 508[1].
analogon rationis, **40**[2].
analogum, ii. 590[1].
a necessitate rei, signi, ii. 625[1].
anima, **47**[1], 116[1], ii. 82[2].
anima mundi, **47**[1], ii. 822[1].
antithesis, **57**[1].
a parte ante, **57**[2].
a posteriori, **60**[2], 64, 539[2], ii. 275[1].
appellatio relativa, ii. 528[2].
a priori, 64[1], 60[2], ii. 129[1]; 20[1], 56, 40[2], 44[1], 334[2], 335[1], 362[2], 588[1], 595[2], 630[2], ii. 54[2], 130[2], 143[2], 271[1], 275[1], 738[2], 313[1], 320[2], 401[2], 442[1], 564[1], 608[1], 687[1], 702[2].
arcana, **65**[2].
argumentatio, 67[1].
argumentum ad baculum, ad hominem, ad populum, ad verecundiam, 373[1].
aseitas, **75**[2].
axiomata, 97[2].
axiomata media, 348[2].

Barbara, **101**[1], 554[1], ii. 88[2], 402[2], 449[2].
Baroco, **101**[2].
bellum, 113[2].
bene esse, ii. 373[2].
Bocardo, **123**[2], 554[1].
bona fides, **124**[2], 381[1].
bonum, **125**[1], 75[2], ii. 590[1], 710[2].
Bramantip, **143**[2].

cabala, **149**[1].
cacodemonia, **149**[2].
calculus, **150**[1], 558[1], ii. 42[1].
camera obscura, ii. 778[2].
camestres, 643[1].
canthus, **153**[2].
categoricus, ii. 329[1].
causa efficiens, 27[1], 90[1].
causa finalis, 27[1].
causa immanens, transiens, ii. 712[1].
causa proxima, 163[1].
causa sui, **163**[1], ii. 508[2].
celarent, **168**[1], ii. 88[2], 402[2].
Cesare, **171**[1], 643[1].
circulus in demonstrando, 373[1].
circulus in probando, **183**[2], 373[1].
cogito ergo sum, **192**[2].
cognitio pura, ii. 401[2].
cognitio sensitiva, 584[1].
coincidentia oppositorum, ii. 562[2].
communes notiones, ii. 498[2].
communicatio idiomatum, **200**[1].
compos mentis, **204**[2], ii. 181[1].
conatus, **207**[1], ii. 511[2], 816[2].
conceptus, *639*[1].
conditio sine qua non, ii. 143[1].
conscientia, ii. 656[1].
consensus gentium, **217**[2].
consequentia, ii. 531[1].
contingens, ii. 89[2].
continuum, **225**[2], ii. 657[1]; 531[1], ii. 7[2].
contradictio, *639*[1].
copula, **234**[2], ii. 26.
corpus, **236**[2].
corpus Aristotelicum, 350[1].
corpus mysticum, ii. 218[2].
culpa, **247**[1], ii. 149[2].
cultus, **248**[2].
curator, 542[2].
cursus naturae, ii. 731[1].

damnum absque iniuria, **252**[1].
Darapti, **253**[1], 554[1].
Darii, **253**[1].
Datisi, **253**[2].
datum, **253**[2], 368[1], 414[1], 456[2].
descensus, ii. 625[1].
dedalium, 513[2].
deductio, **258**[2].
de facto, **253**[2].
definitio, *639*[1].
definitio nominis, ii. 179[2].
de generibus et speciebus, 159[2].
de homine libero exhibendo, 435[1].
de inesse, ii. 402[1].
de iure, **253**[2].
de modis significandi, ii. 529[1].
de more geometrico, ii. 416[1].
de motu, 517[1].
de primo ad ultimum, **270**[2].
de rerum natura, ii. 140[1].
determinatio, ii. 147[2].
determinatio est negatio, ii. 257[2].
deus ex machina, **274**[2].
dicta probantia, **279**[2].
dictio, ii. 625[1].
dictum, **279**[2], (Aristot.) 68[1], ii. 22[1], 88[1], 630[2].
dictum de omni et nullo, **279**[2], 68[1], 526[1], ii. 145[2], 183[2], 412[1], 630[2], 737[2], 740[1].
differentia, *639*[1], ii. 411[1].
dignitas, 105[2].
dignitas dignitatum, 643[2].
disamis, **284**[1].
disciplina, 65[1].

disparatum, *639*[1].
dolus, **293**[1].
donum superadditum, **295**[1].
dura mater, 552[2].

effectus, 164[2].
effluvium, **311**[2], ii. 278[1].
ego, **312**, 35[1], ii. 181[1], 508[1]; 299[1], ii. 310[2], 401[2].
elementa, *639*[1].
eminenter, **316**[2].
ens, **327**[2], *639*[1], ii. 710[2].
ens actuale, possibile, ii. 590[1].
ens creat existentias, ii. 203[2].
ens est unum verum bonum, ii. 720[1].
ens per essentiam, ab alio, ii. 591[1].
ens rationis, ii. 448[1], 449[2], 590[1], 814[1].
ens realissimum, ii. 202[2].
entitas, *639*[1].
esse, *639*[1], 503[1], ii. 590[1], 626[2].
essentia, *639*[1], 422[2], 630[2], 631[1].
ex aequo et bono, 338[2].
ex cathedra, 541[2], ii. 309[2].
exclusi tertii principium, **356**[2].
excommunicatio maior, minor, 357[1].
ex hypothesi, ii. 145[2].
existentia, *639*[1], ii. 590[1].
experimentum crucis, **362**[2], 362[2].
explicite, **363**[1].
ex post facto, **355**[1], 120[1].

facta, 334[2].
factor, **368**[1].
fallacia consequentis, ii. 181[1].
falsus, ii. 717[2].
Fapesmo, Faresmo, **374**[2].
Felapton, **378**[2].
felicitas, 350[2].
Ferio, Ferison, **379**[1].
Fesapo, Festino, **380**[1].
flexibilitas cerea, 158, 599[1].
fiat, **381**[1], 12[2], ii. 179[2], 763[1]; 573[2].
fides, **381**[2].
filioque, **383**[1].
finis, 561[1].
finis ultimus, ii. 487[2].
focus, 81[2].
folium, **387**[1].
fons vitae, 30[2].
forma, *639*[1], ii. 52, 53.
forma, formalis, formaliter, **392**[1], *639*[1].
forma prima radicalis et astralis, ii. 52[1].
formalitates, ii. 764[1].
formaliter, *639*[1], ii. 55[1], 282[1], 608[1].
fortitudo, 393[2].
forum, **393**[2].
forum delicti (commissi), 394[1].
forum domicilii, 394[1].
forum rei sitae, 394[1].
Fresison, **396**[2].
fundamentum, **398**[1].
fundamentum divisionis, 290[2], 398[1].
fundamentum relationis, 398[1], ii. 448[2], 440[2].
fundamentum universalitatis, ii. 735[1].

generalis, ii. 141[1].
genius, **410**[1].
genus, **411**[2], ii. 621[1], *639*[1]; 424[2], 600[2], ii. 329[1], 411[1].
gutta serena, 36[1].
gyrus, **434**[2], 123[2].

habeas corpus, **435**[1].
habere, ii. 315[2].
haecceitas, **437**[1], *639*[1], 535[2], ii. 423[1].
hemi, **467**[1].
honestum, 484[2].
hyper, **489**[1], ii. **622**[2].

idealiter, ii. 608[1].
identicum, ii. 590[1].
idola, 373[2], 511[1].
ignava ratio, ii. 556[2].
ignorantia facti, legis, 511[1].
ignoratio elenchi, **511**[2], 373[1], 575[2], ii. 44[2].
imago, **519**[1].
imperia in imperio, ii. 593[2].
implicite, 363[1].
impossibile, ii. 89[2].
in actu, 3[1], ii. 701[1].
in adiecto, 525[2].
in causando, in essendo, in praecando, ii. 145[2].
inclinatio, *639*[1], 535[2].
index, **531**.
in dictione, 372[2].
individuatio, *639*[1].
individuum, *639*[1], 537[2].
inductio per enumerationem simplicem, 537[2].
inertia, **541**[1].
in esse, **528**[1], ii. 466[1]; 528[1], ii. 421[1].
infima species, 290[2], 411[2].
infinitatio, ii. 199[1].
influxus physicus, **546**[1], ii. 82[2], 199[2].
in intellectu, **528**[1], 528[1], 544[1], ii. 421[1].
in loco parentis, 307[2].
innotus, ii. 131[2].
in personam, 12[1], 17[1], 301[2].
in posse, **528**[1], ii. 421[1].
in potentia, ii. 558[1], 735[1].
in re, in rem, **528**[1], 12[1], 17[1], 301[2], ii. 421[1], 466[1].
in se, 544[1].
insolubilia, **554**[1].
in suo genere, ii. 373[2].
intellectus, ii. 294[2].
intellectus agens, passivus, ii. 590[2].
intellectus purus, ii. 401[2].
intelligibilis, *639*[1], 559[2].
intentio, *639*[1].
intentio intentionalis, 561[1].
intentio, prima et secunda, 561[1].
inter se, ii. 36[2].
irrefragibilis, 30[2].
iudex, 65[1].
ius, 641[1].
ius civile, ii. 478[2].
ius fetiale, 564[2].
ius honorarium, ii. 478[2].
ius naturale, ii. 196[2], 512[1].
ius respondendi, 565[1].
iustitia, 585[2].

lex, 641[1].
lex fori, 394[1].
limen, ii. 6[2].
loci classici, 120[2].
logia, 418[1].
logica docens, utens, ii. 21[1].
logica vetus et nova, ii. 206[2].
lumen gratiae, naturale, ii. 32[1].
lux mundi, 93[1].

magister officiorum, 124[1].
Magna Charta, 175[1].
maiestatis crimen, ii. 3[2].
maior, ii. **37**[1], 86[1].
malopterurus, 313[1].
malum, ii. **38**[2].
mandator, 25[1].
mare clausum, mare liberum, ii. 41[2].
materia, *639*[1], 630[2], ii. 51[2], 714[1].
materialis, *639*[1].
materialiter, *639*[1], ii. 55[1].
maxima, ii. 55[2].
maximus homo, ii. 627[2].
medium, ii. **60**[2], 82[1].
medius, ii. 176[1].
mens, ii, 82[2], 229[2].
meridialis, 42[1].
minimum, ii. 86[1].
minimum divisibile, ii. **86**[1].
minor, ii. **86**[1], ii. 86[1].
modi praedicandi, ii. 325[1].
modulus, ii. **94**[1], 340[2].
modus ponens, ii. **94**[2]; 493[1], ii. 617[1], 633[2], 647[2].
modus tollens, ii. **94**[2]; 493[1], ii. 617[1], 647[2].
morbus comitialis, 331[1].
morbus divus, 331[1].
morbus sacer, 331[1].
motus, ii. 315[2].
motus animi, 22[1].
mundus, ii. **118**[1]; 306[1], 559[2], ii. 742[1], 821[2].
mundus intelligibilis, ii. 184[2].
muscae volitantes, 327[2].
mutatio, 171[2].

natura, *639*[1], ii. 140[2], 141[1].
natura naturans, natura naturata, ii. **133**[1]; 3[2].
natura non facit saltum, ii. **133**[1], 726[2].
necessarium, ii. 89[2].
ne fiat divisio per saltum, 291[1].
negatio, *639*[1], 381[1].
neglegentia, ii. 149[2].
Nemesius, ii. **149**[2].
Neo, ii. **149**[2].
neutrum, 507[1].

nexus, ii. **176**[2].
nihil est in intellectu, ii. **177**[2].
nihil ex nihilo, ii. **177**[2].
nisus, ii. **178**[2].
nomen connotans, ii. 528[2].
nomina, ii. 422[2].
non actio, sed status, 113[2].
non causa pro causa, 575[2], ii. 44[2].
non compos mentis, ii. **181**[1].
non-ego, ii. **181**[1].
non sequitur, ii. **181**[1], ii. 44[2].
noscere, 602[2].
nota, ii. 43[1].
nota notae, ii. **183**[1], ii. 631[1].
notio, *639*[1].

obiectum, *639*[1].
obiter dictum, 156[1].
obligatio, ii. 194[1].
omne vivum e vivo, 117[2].
omnis cellula e cellula, 169[2].
onomatopoesis, 507[1].
opposita, ii. 315[2].

pars opercularis, ii. 19[1].
partes extra partes, ii. 815[1].
particularis, ii. 141[1].
particulariter, ii. 276[2].
particulatio, ii. 266[1].
parva logicalia, ii. **266**[2]; 363[1].
passiones, 22[1].
passiones entis, ii. 267[1].
patria potestas, 373[2].
penumbra, 3[1].
per accidens, **7**[2], ii. 89[1], 281[2], 328[2].
per aggregationem, ii. 735[1].
per aliud, ii. 282[1].
per compositionem, ii. 705[1].
per enumerationem simplicem, **357**[1], ii. 531[1].
per impossibile, ii. 435[1].
per saltum, 541[2].
per se, ii. 329[1], ii. 281[1], 408[2].
per se primo modo, secundo modo, ii. 282[1].
perseitas, ii. 494[2], 504[2].
perseitas boni, ii. 281[1].
persona, *639*[1], 491[2], ii. 613[2].
perturbationes, 22[1].
petitio principii, ii. **287**[2]; 109[2], 497[2], ii. 290[1]; 372[1], ii. 44[2].
phylum, 553[2].
pia mater, 552[2].
pithecanthropus erectus, ii. **302**[1].
plenum, ii. **305**[2], ii. 747[1], ii. 45[2].
pleroma, ii. **305**[2].
plexus, ii. **305**[2]; 405[1].
pluralitas, ii. 306[2].
pons asinorum, ii. **309**[1].
posit, ii. 181[1].
positio, *639*[1].
possibilis, *639*[1], ii. 89[2].
post hoc, ergo propter hoc, ii. **315**[2], ii. 181[2].
posterius, ii. 342[2].
potentia, *639*[1], ii. 319[1], 590[1].
potentia pura, ii. 402[1].
praecisio, ii. 323[2].
praedicamenta, ii. 315[2], 410[2].
praedicatio, ii. 325[2], 328[1].
praedicatio in quale (in quid), ii. 329[1].
praedicatum, ii. 607[2].
praescriptio, ii. 332[2].
praesumptio iuris et de iure, ii. 337[2].
praetensio, ii. 371[1].
prima, 443[2].
primum cognitum, ii. **341**[1]; 643[2].
primum mobile, ii. **341**[1].
primum movens, 3[2].
primus in orbe deos fecit timor, 376[2].
principalis efficiens, ii. 307[2].
principium identitatis, 534[1], 643[2].
principium individuationis, *639*[1], 643[2], ii. 494[2].
principium rationis, ii. 617[2].
prior, ii. 315[2].
prius, 500[2], ii. 315[2], 342[2].
prius natura, dignitate, causalitate, ii. 343[1].
privilegium, ii. 343[2].
probandum, 372[1].
prodromata, ii. **357**[1].
prognosis, ii. **358**[1].
proportio, *639*[2].
proslogium, ii. 202[2].
pulchritudo, 105[2].

quadrivium, ii. 492[1].
quale, ii. 406[2].
qualia, ii. 406[2], 407[2], 444[2], 445[2].
qualitas, *639*[2], ii. 407[2].
quantitas, *639*[2].
quicunque, ii. **412**[2].
quidditas, ii. **412**[2]; *639*[2].
quinque voces, ii. **412**[2]; *639*[2], ii. 325[1].
quod est, *639*[2].
quod quid est, *639*[2].

ratio, ii. **415**[1]; *639*[2], ii. *294*[2], *726*[2].
ratio essendi, cognoscendi, ii. 425[1].
ratio obiectalis, ii. 608[1].
ratio seminalis, ii. 514[1].
realitas, *639*[2].
reductio ad absurdum, ii. **434**[2]; 57[2], 643[2].
res, ii. **466**[1].
res adiudicata, ii. 466[2].
res aliquid, ii. 710[2].
res, ante res, post res, in rebus, ii. 421[2].
res cogitans, 298[2], ii. 93[1].
res corporales, incorporales, ii. 360[2].
res de re praedicare non potest, ii. **466**[2].
res divini iuris, ii. 466[2].
res extensa, 298[2], 503[1], ii. 93[1].
res extra commercium, ii. 466[2].
res gestae, ii. 466[1].
res integra, ii. 466[2].
res mancipi, ii. 466[2].
res nullius, ii. 466[1].
res publicae, ii. 466[2].
res tota simul, ii. 700[2].
residuum, ii. **468**[1]; 23[2].
resplendentia formae, 106[1].
respondeat superior, ii. 149[2].
reus, 12[1], 352[1].

saltus, ii. **484**[2].
saltus in concludendo, ii. 484[2].
scala predicimentalis, ii. 714[1].
scintilla conscientiae, ii. 656[1].
scire, 602[2].
secunda intentio, ii. 589[2].
secundum potentiam, ii. 701[1].
secundum quid, ii. **504**[2], ii. 145[2], 281[2].
secundum rationem, fidem, ii. 425[2].
semper, ubique, et ab omnibus, ii. 740[1].
sensibilis, *639*[2].
sensilla, ii. **518**[2].
sensus communis, 345[1], 592[2].
sensus compositus, ii. 145[2].
sensus divisus, ii. 145[2].
sensus usualis, ii. 92[2].
sententiarum libri tres, 575[2].
sermo, ii. 423[1].
significatum, ii. 529[1].
similia similibus percipiuntur, ii. **530**[2], ii. 278[1].
simpliciter, 159[2].
simul, ii. 315[2].
sine qua non, ii. **533**[1], ii. 539[1].
singularia, 537[2].
societas leonina, ii. **543**[2].
socius, ii. **548**[2]; 341[1], ii. 508[1].
sophismata aurea, 554[2].
sophistici elenchi, 554[2].
sorites, ii. **557**[1]; 171[2], ii. 448[1].
sortes, ii. 625[1].
species, ii. **566**[2]; 173[2], 601[1], *639*[2], 424[2], 425[2].
species intentionalis, sensibilis, ii. 590[2].
spiritus, 116[1], ii. 82[2], 585[1].
status, ii. **601**[2]; 25[1], 113[2], 585[2], ii. 744[2].
subdita, ii. 607[2].
subiectivum, ii. 607[2].
subiectum, *639*[2], ii. 613[1].
subsistentia, *639*[2].
subsistere, *639*[2].
substantia, *639*[1], 422[2], ii. 26[1], 613[1], 714[1].
substratum, ii. 615[1]; 427[2], ii. 613[1].
succubus, ii. **615**[2].
suggestio falsi, ii. 4[2].
sui generis, ii. **620**[1]; 542[2].
summa, 174[1].
summa Pisana, Artisana, Angelica, Rosella, Pacifica, 157[2].
summa totius logices, 554[2].
summum bonum, ii. **621**[1]; 417[1], 75[2], 343[2], 344[1], ii. 205[2], 487[2], 718[2].
summum genus, ii. **621**[1], 290[2], 411[2], ii. 93[1].
super, ii. **622**[2].

suppositio, ii. 531[2], 624[2].
suppositum, ii. 613[1], 624[2].
suppressio veri, ii. 4[2].
supra, ii. **625**[2].

tabula rasa, ii. **666**[1], ii. 516[1]; 549[1].
terminus, 13[2], 323[2], 324[2], ii. 191[1], ii. 199[1].
tertium quid, ii. **682**[1], ii. 60[2].
theologia naturalis, ii. 137[2].
tinnitus, 452[2].
totum per aggregationem, ii. 814[2].
traditor, 294[2].
transcendentia, ii. 711[1].
trivium, ii. **716**[1], ii. 492[1].
tubularia mesembryanthemum, 476[1].
tutor, 542[2].

ubi ius, ibi remedium, ii. 4[1].
ubicatio, ii. **723**[1].
ultra, ii. **724**[1].
unica substantia, 298[2].
unio caritatis, 23[1].
unio mystica, 492[1].
universale, ii. 737[1], 741[1].
universalia, *639*[2].
universalis, *639*[2].
universaliter primum, ii. 145[2].
universum, ii. 742[1].
univocum, ii. 590[1].
unum, ii. 590[1], 710[2].
unum transcendentaliter, 594[2].
ut nunc, ii. 26[1].
uti possidetis, ii. **745**[1].
utile, 484[2].

vacuum, ii. **747**[1], ii. 305[2].
venustas, 105[2].
veritas propositionis, *639*[2].
veritas transcendentalis, 594[2].
verum, ii. 590[1], 710[2], 717[2].
veto, ii. **763**[1]; 381[1].
virtualiter, ii. 764[1].
vis activa, ii. 319[1].
vis maior, 112[1].
vis viva, ii. **801**[2].
voces, ii. 422[2].

III. INDEX OF GERMAN TERMS

[Prepared by P. H. Fogel, M.A., and J. W. L. Jones, Ph.D.]

The reference numbers are printed in four different kinds of type: those in black type **123** are terms which occur as main topics in the work; those in modern face type (123, are the formally recommended equivalents; those in italic *123* are terms of which some exposition or discussion is given; and those in old style (123) are those which have passing mention only, but which are mentioned in a way judged of sufficient importance to require citation.

Under each kind of type the citations from vol. ii follow those from vol. i, and are preceded by the Roman numeral ii (which is not repeated); all other citations are from vol. i.

With the page number the column of the page is given in a small figure; where the small figure is omitted the reference is to both columns.

a priori, *595*[2], 594[2].
a priori Grundsätze, *594*[2].
Abänderung (individuell erworbene), ii. 94[1].
Abbildung, 518[1].
Abendmahl, 349[1].
Aberglaube, ii. 623[2].
Aberration, 1[2].
abgezogen, 5[1].
Abgötterei, 511[1].
Abkommen, 273[1].
Abkürzung, ii. 526[2].
Ablass (vollkommener), ii. 305[1].
Ablaut, 2[1].
Ablenkung, 276[1].
Ablenkung der Aufmerksamkeit, 288[2].
abnehmender Gewinn, 281[2].
Abneigung, 57[1], 97[1].
abnorm, 2[2].
Abnormität, 50[1].
Abscheu, ii. **678**[2].
Absicht, 561[1], ii. 678[2].
absolut, 3[1].
Absolute (das), 3[1].
Absolution, 4[1].
Absolutismus, 4[2].
Absonderung, ii. 504[1].
Absorptionsgesetz, ii. *25*[1].
abstrakt, 5[1], *459*[2], 459[1].
abstrakte Allgemeinheit, 464[1].
abstrakte Vorstellung, 5[1].
Abstraktion, 6[1].
Abstossung, 89[2].
Abtragung, 366[1].
Abulie, 2[2].
Accent, 7[1].
Acceptationstheorie, 85[1].
Accidenz, 7[2].
Accommodation, 7[2], 8[1].
Accord, 176[2].
Achromatopsie, 9[1].
Achtel, 181[1].
Achtung, ii. 468[2], 472[1].
Act, 321[2].
Acte, 11[2].
Action, 12[1], 13[2].
Action und Reaction, 12[2].
Actionsstrom, ii. 149[1].
Actionsvermögen, 12[2].
Activität, 13[1].
Actualität, 14[2].
acute Demenz, ii. 605[1].
Adaptation, 15[2].
adäquat, 16[1].
adiaphoristischer Streit, 16[1].
Admiralitätsgerichtbarkeit, 7[1].
Adoptionismus, 18[2].
Advent, 19[1].
Advokat, 19[1].
Aehnlichkeit, ii. 6[1].
Aequipollenz, 338[1].
Aequivalent, 599[2].
Aequivalent (mechanisches), ii. 59[1].
aesthesiodisch, 19[2].
aesthesiogen, 19[2].
Aesthetik, 20[1], 33[1], 594[2].
aesthetisch, 20[1].
aesthetische Sympathie, ii. 653[1].
aesthetischer Absolutismus, 4[2].
aesthetischer Massstab, 21[2].
aesthetischer Schein, *103*[1].
Aestiologie, 21[2].
Aether, 342[2].
Aeusserlichkeit, ii. *97*[2].
affectiver Bewegungsreiz, 21[2].
Affekt, 316[2], ii. 267[1]; *22*[1].
Affen, 51[1].
Agent, 25[1].
Agentschaft, 24[2].
Agentur, 24[2].
Agglutination, 25[1].
Aggregat, 25[2], 26[1].
Agnosie, 26[1].
Agnosticismus, 26[1].
Agraphie, 27[2].
Ahnencult, 46[1].
ähnlich, ii. 530[2].
Akademie, 6[2].
Akatamathesie, 6[2].
Akataphasie, 6[2].
Akumetrie, 9[2].
Akusma, 9[2].
Akustik, 9[2].
akut, 182[1].
Alalie, 28[2].
Alexandrinische Schule, 30[2].
Alexie, 32[1].
Algebra der Logik, ii. 640[2].
algedonische Aesthetik, 33[1].
Alkoholismus, 29[1].
all, 33[2], ii. 742[1].
Allaesthesie, 33[2].
Allbeseelung, ii. 256[1].
allerletzt, ii. 723[2].
Allgegenwart, ii. 200[2], 723[1].
allgemein, ii. 737[1], *678*[2].
Allgemeinbegriff, 208[1], 406[1].
Allgemeine (das), 456[1].
allgemeine Glückseligkeit. ii. 741[2].
allgemeine Sätze, ii. *739*[1].
allgemeiner Terminus, 407[1].
allgemeines Wohl, 407[1].
Allgemeingültigkeit, ii. 742[1].
Allgemeinheit, 464[2].
Allgemeinheit (abstrakte), 464[1].
Allgemeinheit (concrete), 464[1].
Allgemeinheit (empirische), ii. *739*[2].
Allheit, *161*[1].
Allmacht, ii. 200[2].
Allochirie, 34[1].
Allwissenheit, ii. 201[1].
Alogie, 34[1].
Alpdrücken, ii. 177[2].
Alphabet, 34[1].
Altklugheit, ii. 324[1].
Altruismus, 35[2].
Amaurose, 36[1].
Ambidextrie, 36[2].
Amblyopie, 36[2].
Ametropie, 36[2].
Amimie, 36[2].
Amitose, 37[1].
Amixie, 37[1].
Amnesie, 37[2].
Amoebe, 37[2].
Amortisation, 37[2].
Amphibolie, 38[1].
Amphimixie, 38[1].
Amulet, 38[1].
Amusie, 38[2].
an etwas, 460[1].
an ihm, *460*[1], 459[1].

an ihm selbst, 459[1].
an sich, **39**[1], 528[1], *459*[2], *460*[2], *595*[2], 459[1], 461[2].
an sich oder für uns, *461*[2], 459[1].
an und für sich, **39**[1], 528[1], *103*[1], *461*[1], 459[1].
An-und-fürsichsein, *461*[1], 462[2].
Anabaptisten, 39[1].
Anabolismus, 39[1].
Analgesie, 40[2].
Analgie, 40[2].
analoge Organe, 40[2].
Analogie, 41[1].
Analogie der Erfahrung, 40[2], *42*[2].
Analogie des Glaubens, 42[2].
Analyse, 42[2], 43.
Analytik, *594*[2], *597*[1].
analytische Methode, 45[1].
analytisches und synthetisches Urteil, 43[2].
Anämie, 39[2].
Anamnese, ii. 463[1].
Anaphase, 45[1].
Anaphie, 45[1].
Anarchismus, 45[1].
Anarthrie, 46[1].
Anästhesie, 39[2].
Anbetung, 18[2].
andere (das), 312[1], ii. *485*[1].
andere (der), 35[1].
Andere (das) (und (das) Gleiche), ii. 484[2].
Anderes (ein), 462[1].
Anerkennen (-ung), *7*[2], *110*[2].
Anfall, 384[2].
Anfang, 548[2].
anfangend, ii. 128[1].
angeborene (Ideen), 548[2].
Angebot und Nachfrage, ii. 623[2].
Angelologie, 46[2].
Angemessenheit, 385[1], ii. 359[2].
Angst, 57[1].
Animismus, 48[2]
Anisometropie, 49[2].
Anklage, 532[2].
Anklageacte, *11*[2].
Ankündigung, ii. 331[1].
Anlage, **49**[2], ii. **678**[2], ii. 329[2], 481[1].
Anlagen, ii. 70[2], 393[1].
Anmuth, 418[2].
Anoia, 50[1].
Anorthropie, 50[2].
Anosmia, 50[2].
Anosmie, 50[2].
anpassend, 15[2].
Anpassung, 7[2], 14[2], 190[1], ii. 217[1].
Anschauung, **50**[2], ii. **679**[2]; 554[1], 568[1], *63*[2], *554*[1], *568*[1], *594*[1], ii. *276*[2], *722*[1].
Anschauungsunterricht, ii. 192[1].
Ansichsein, 459[1].
Ansichten der Tractarianer (die), ii. 707[2].
Anstand, ii. 359[2].
anständig, ii. 359[2].
Anstrengung, 311[2], *206*[2].
Antagonismus, 50[2].
Antagonisten, 50[2].
antagonistisches (etwas), ii. 790[1].
antecedens, 51[1].
Anthropologie, 52[2].
Anthropometrie, 54[2].
Anthropomorphismus, 55[1].
Antichrist, 55[2].
Anticipationen der Wahrnehmung, 56[1].
Antinomie, 56[2].
Antinomien, *597*[2], 594[2].
Antinomismus, 56[1].
Antipathie, 57[1].
Antithese, 57[1].
Antrieb, 207[1], *206*[2].
Anziehung und Abstossung, 89[2].
Apathie, 57[2].
Aphakie, 58[1].
Aphasie, 58[1].
Aphemie, 58[2].
Aphonie, 58[2].
Aphrasie, 58[2].
Aphthongie, 59[1].
Aplasie, 59[1].
apodictisch, 59[1].
Apogamie, 59[1].
Apokalypse, 59[1].
Apokatastase, 59[2].
apolare Zelle, 59[2].
Apollinarismus, 59[2].
Apologetik, 60[1].
Apoplexie, 60[1].
Apotheose, 60[2].
Apparate, 605[1].
Apperception, 61[1], *593*[2], 592[2], 594.
Apperception (Einheit der), *593*[2].
Apperceptionsmasse, *61*[1].
Apperceptionssystem, *61*[1].
Apprehension, 62[2].
Apraxie, 64[1].
Aprosexie, 64[2].
Aquino (Lehre des Thomas von), ii. 696[1].
Arbeit, 616[1], ii. 821[1].
Arbeitslohn, ii. 810[1].
Arbeitstag (-stunden), 486[2].
Arbeitstheilung, 291[1].
Arbitrage, 65[1].
Arcana, 65[2].
Archäologie, 65[2].
Archetyp, 66[2].
Argument (Argumentiren, Argumentation), 67[1].
Argument (ontologisches), ii. 292[2].
Argumentation, 67[1].
Argumentiren, 67[1].
Arianismus, 67[1].
Arier, 74[2].
Aristocratie, 67[2].
Arithmomanie, 68[2].
Armengesetzgebung, ii. 309[2].
Arminianismus, 68[2].
Armuth, ii. 318[2].
Art, 600[1], ii. 566[2].
Art der Lehnbarkeit, ii. 675[1].
Arten (Ursprung der), ii. 243[2].
Arterie, 73[2].
Artikulirung, 73[2].
Arzneimittel (psychische Wirkungen der), ii. 376[1].
Asceticismus, 74[2].
Asemie, 76[1].
Aspiration, 76[2].
Assimilation, 76[2].
Association, 78[1], 79[1].
Associationspsychologie, 80[1].
Asthenie, 81[2].
Asthenopia, 81[2].
ästhetisches Gefühl, ii. 521[2].
Astigmatismus, 81[2].
Asymbolie, 82[1].
Asymmetrie, 82[1].
Asynergie, 82[2].
Atavismus, 83[1].
Ataxie, 83[1], 529[2].
Athanasianisches Glaubensbekenntniss, 84[1].
Atheismus, 84[1].
Athemmesser, ii. 587[1].
Ätiologie, 349[1].
Atomen (psychischen, Theorie der), ii. 85[2].
Atrophie, 85[2].
Attribut, 90[1].
Attrition, 90[2].
Aufbau, ii. 604[2].
Aufbewahrung, ii. 470[2].
Aufeinanderfolge, ii. 615[1].
Auferstehung, ii. 470[1].
Auffassung, 62[2], ii. *681*[1].
Aufheben, ii. 611[1].
aufheben, *457*[1], *459*[1], 455[1].
Aufklärung, **91**[1], 326[2], 371[1].
Auflösung, 288[1].
Aufmerksamkeit, 85[2], 288[2], 387[1].
Aufregungszustand, 355[1].
Aufrichtigkeit, ii. 532[2], 744[1].
aufstrebende Werthe, ii. *825*[1].
Auge, ii. 769[2].
Augenaxe, ii. 206[1].
Augenbewegung, 295[1].
Augenbewegungen, 366[1].
Augenbewegungen (Listing'sches Gesetz), ii. 8[2].
Augenblick, ii. 678[1].
Augengrau, 510[1].
Augenmass, 366[1], ii. 801[1].
Augenschwarz, 510[1].
Augenwinkel, 153[2].
Augsburgische Konfession, 91[1].
Augustinianismus, 91[1].
Aura, 92[1].
aus reiner Vernunft, 591[1], 594[2].
Ausbreitung, 287[1].
Ausdehnung, 363[1], 365[1].
Ausdruck, 363[1].
ausdrücklich, 525[2].
Ausdrucksbewegungen, 317[2].
Ausgaben, 360[2].
Ausgleichungs-Rechnung, 340[1].
ausländisch, 389[2].
Auslese, ii. 504[2].
Auslese (natürliche), ii. 134[1].
Auslese (physiologische), ii. 300[2].
Auslese (sexuelle), ii. 525[1].
auslesende Denken (das), ii. 507[2].
Ausschalten, 313[2].
Aussage, ii. 326[1].

Aussensein, ii. 251².
Aussenwelt, 365¹.
ausser Gebrauch treten, 273¹.
äusseres Keimblatt, 310¹.
äusserlich, 566¹.
aussernatürlich, ii. 338².
Ausstrahlung, 314¹, 574².
Ausüben (-ung), 357².
Ausübung, ii. 681¹.
Auswahl, 74¹, ii. 504².
Auswahl und Unterdrückung (soziale), ii. 540¹.
Authenticität, 92².
Autokinese, 93¹.
automatisch, 93².
automatisches Schreiben, 94².
Automatismus, 93², 95¹.
Autonomie, 95².
Autorität, 92².
Autosuggestion, 96¹.
Averroismus, 96².
Aversion, 97¹.
Axencylinder, 98¹.
Axiom, 97².

Baer'sches Gesetz, 100¹.
Bahnung, ii. **679**²; 367².
Baptisten, 101¹.
Barok, 101².
Baseler Konfession, 102¹.
Bastard- (hybridisch), 488².
Bau, ii. 604².
Bauchreden, ii. 760².
Baukunst, 67¹.
Baum des Porphyrius, ii. 714¹.
Beängstigung, 57¹.
Bedauern, ii. 438².
Bedeutung, ii. **679**²; 526¹, ii. 528¹, ii. *678*¹.
Bedeutungslehre, ii. 529¹.
Bedingung (hinreichende), ii. 143¹.
Bedingung (nothwendige), ii. 143¹.
Bedürfniss, ii. 146¹, 811¹.
Befriedigung, ii. 487².
Befruchtung, 379².
Begabung, 64².
Begehren, 62¹.
Begehren (Begehrung, Begehrungsvermögen), *206*².
Begehrungsvermögen (das), *591*².
Begierde, 62¹, *206*².
Begleiterscheinung, 333¹.
Begreifen, 206¹.
begrenzt, 383².
Begriff, ii. **184**²; 208¹, ii. 91², 183²; *457*², *463*, *464*¹, ii. *91*², *184*²; 25², 536¹, 591², 594², ii. *142*¹.
Begriff (subjektiver und objektiver), 463².
Begriff der Causalität, 163².
Begriffen (reine Vernunfterkentniss aus), *591*¹.
begrifflich, 208².
begriffliche Sätze, *44*².
Begriffsbildung, 208¹.
begründet, ii. 93¹.
Beharrlichkeit, ii. 282¹.
Beharrungsvermögen, 541¹.
Behauptung, 23².
Beiprodukt, 333¹.
Beisichsein, *461*¹.
Bejahung, 76².
Bekanntheitsqualität, *191*².
Belgische Konfession, 109².
Belohnung, ii. 472².
Benedictiner, 113².
Beobachtung, ii. 198¹.
Beobachtung (innerliche), ii. 198¹.
Beobachtung (Selbst-), ii. 198¹.
Beobachtungsrechnung, ii. 198².
Beraubung, ii. 343².
Berauschung, 565².
Berufung, 311¹.
Beschaffenheit, *460*², 459¹.
Beschaffenheit (psychische), ii. 68².
Bescheidenheit, ii. 93².
Beschränktheit, 377¹.
Beschwörung, 359².
Beseelung, ii. **679**², ii. 678¹, ii. *640*¹.
Besessenheit, ii. 198², 313¹.
Besinnung, ii. 436¹.
Besonderheit, *464*¹.
beständige Bewegung, ii. 280².
Beständigkeit, ii. 280².
Bestätigung, ii. 761².
Besteuerung, ii. 663¹.
Bestimmen, *460*².
bestimmt, 273¹, 459¹, 462¹.
bestimmt gerichtet, 273¹.
Bestimmtheit, *460*², 462¹.
Bestimmung, 273², *460*², 459¹, 461¹, 464¹.
Bestimmung des Menschen, 460².
Bestrafung, ii. 397¹, 401¹.
Betäubung, ii. 128¹.
Betäubungsmittel, 40¹.
Betonung, 7².
Betrug, 395¹.
Betrunkenheit, 297².
Beugmuskel, 386².
Beurteilung, 65¹.
Beurtheilung, *580*².
Bevölkerung, ii. 309².
Bewährung, ii. 761².
Beweggrund, 323², *21*².
Beweglichkeit, ii. 89¹.
Bewegung, ii. 111², 113², 116¹.
Bewegung (beständige), ii. 280².
Bewegung und Ruhe, ii. 112².
Bewegung (wurmförmige), ii. 280².
Bewegungs-(werkzeug, &c.), ii. 20².
Bewegungsempfindung, 600¹.
Bewegungslosigkeit, 28².
Bewegungsmenge, ii. 98¹.
Bewegungsreiz, 21².
Bewegungsstereotypie, 599¹.
Bewegungstäuschungen, 512².
Bewegungsvorstellung, 599².
Beweis, 67¹.
Beweis (teleologischer), ii. 663².
Beweis-Fehler, 372¹.
Beweismittel, 351².
Bewerthung, 62².
Bewilligung, 76².
Bewunderung, 17¹.
bewusste Selbsttäuschung, ii. 513².
bewusster Reflex, ii. 436¹.
bewusster Schein, ii. 37¹.
Bewusstsein, 177², 381², 592².
Bewusstsein (religiöses), ii. 462².
Bewusstsein (soziales), ii. 534¹.
Bewusstsein überhaupt, *520*².
Bewusstseins (Einheit des), ii. 68¹.
Bewusstseins (Engerung des), ii. *619*¹.
Bewusstseinselement, 313².
Bewusstseinsmonismus, *520*².
Bewusstseinszustand, ii. 598².
bezaubern, 174².
Beziehung, ii. 439².
Beziehungsgesetz, ii. 450².
Beziehungsgrund, 398¹.
Beziehungslehre (logische), ii. 447².
Beziehungs-Urteil, *44*².
Beziehungswahn, ii. *262*¹.
Bibel, 115².
Bibelkritik, 115².
biblische Psychologie, 116¹.
biblische Theologie, 116².
Bild, 516¹, 599², *518*¹.
Bild (bildlich), 382¹.
bildend, *186*¹.
Bilder (Purkinje'sche), ii. 403².
Bilder (Sanson'sche), ii. 403².
Bilderdienst, 516².
Bildung, 392¹.
Billigkeit, 338².
Billigung, 63².
binaurales Hören, 117².
binoculare Farbenmischung, 197¹.
binoculares Sehen, 117².
biogenetisch, 118¹.
biogenetischer Grundsatz, 118¹.
Biologie, 119².
biologische Continuität, 117².
Bionomie, 120¹.
bionomische Kräfte, 119².
bionomische Verhältnisse, 328².
Biophoren, 120¹.
Blastoderm, 121¹.
Blastula, 121².
Blatt, 387².
blau, ii. 570¹.
Blaublindheit, *279*².
Blick, 47¹, 353¹.
Blickfeld, 381².
Blicklinie, ii. 8¹.
Blickpunkt, 386¹.
blinder Fleck, 121².
Blindheit, 122¹.
Blödsinn, 50¹.
Blut, 123².
Blutarmuth, 39².
Boden-Werth, 618¹.
böser Blick, 353¹.
Bosheit, ii. 37², 38¹.
Böswilligkeit, ii. 37².
Brechung, ii. 437².
Brodherr, 321².

Brüderlichkeit, 394[2].
Brüderschaft, 394[2].
Brutto-Einnahme, 431[2].
Bücher (die Sibyllinischen), ii. 527[1].
Buchstabenproben, ii. 686[1].
Buddha, 147[1].
Bulbus, 147[2].
Bundesacte, *11*[2].
Bundesstaat, 377[1].
Bürger, 184[1].
bürgerlich, 184[1].
bürgerliche Gesellschaft, ii. *597*[1].
bürgerliches Recht, 184[1].
Bürgerschaft, ii. 593[2].
Busse, ii. 276[1].
Byzantin, 148[1].

Calvinismus, 150[2].
Cameral-Wissenschaft, *383*[2].
Cardinalzahl, ii. 117[1].
Carmeliter, 155[2].
Causalität, 163, *161*[1].
cellulifugal, 169[2].
Census, *563*[1].
central, 169[2].
Centralnervensystem, ii. 171[1].
centrifugal, 311[1].
Centrifugalkraft, 170[1].
Centripetalkraft, 170[1].
Centrosoma, 170[2].
Centrum, 169[2].
Centrum, vasomotorisches, ii. 759[2].
Characteristik, 173[2].
Charakter, 173[2].
Charakterologie, 348[2].
Charitas, 174[1].
chemische Synthese, 175[1].
Chiliasmus, 175[2].
Chiromantik, 176[1], ii. 255[1].
Chorda, ii. 184[2].
Christenthum, 177[2].
christliches Bewusstsein, 177[2].
Christologie, 178[1].
Christophania, 180[2].
Christus, 176[2], 487[2].
chromatische Aberration, 1[2].
chromatische Tonlehre, 181[2].
Chromatopseudopsis, 181[2].
Chromatopsie, 181[2].
Chromoaesthesie, 181[1].
chronisch, 182[1].
circulär, 183[1].
circuläres Irresein, 35[1].
Cirkelbeweis, 183[2].
Cisterzienser, 183[2].
Civilklage, *12*[1].
Civilrecht, 184[1].
Coelomaten, 192[1].
Cölibat, 168[1].
Collateralen, 193[2].
Colligation, 194[1].
Colligationsbegriff, *194*[1].
Combinationston, 198[1].
Commissur, 199[1].
Complementärfarbe, 203[2].
Complication, 204[1].
complicirt, 203[2].
complicirte Anpassung, 190[1].
Compositionstheorie, 205[2].
Compromiss, 206[1].
Conatus, ii. 511[2].
Concret, *459*[2], 459[1].
concrete Allgemeinheit, 464[1].
Concurrenz, 77[1].
congenitale Eigenschaften, 10[1].
Consistenz, 27[2].
constanten Orientirung (Gesetz der), ii. 242[2].
Consumption (unproduktive), ii. 743[1].
continuirliche Raumerfüllung, ii. 305[2].
Continuität, 117[2].
Contract (sozialer), ii. 534[2].
corticale Lokalisation, ii. 15[2].
Critik, ii. *21*[2].

Dankbarkeit, 421[1].
Darmbewegung, ii. 280[2].
darstellen, ii. **679**[2].
Darstellung, ii. 333[1].
Dasein, ii. 421[1]; *462*[1], 455[1], 456[1], 461[2], 462[2], ii. 421[1], 485[1].
Dauer, 300[2], ii. 615[1].
Dauer der Schwangerschaft, 413[1].
Demenz (acute), ii. 605[1].
Demuth, 487[2].
denke (Ich), *593*[2], *594*[2], ii. *68*[2].
Denken, ii. 426[1]; *463*, *591*[2], 456[2], 460[2], 464[1], 465[1], 594[1].
Denken (das), ii. 696[1].
Denken (das auslesende), ii. 507[2].
Denkgesetze, 641[1].
Denkvermögen, 313[1].
Dependenz, *161*[1].
Desintegration, 285[2].
Determinanten, 273[1].
Determination, 273[2].
Determinismus, 274[1].
Deuteranopie, 274[2].
deutlich, 189[1].
Deutlichkeit, ii. 287[1].
Deviation, 276[1].
Diagnose, 278[1].
Diagonalkraft, ii. 470[1].
Diakustik, 278[1].
Dialektik, 278[1], *597*[1].
Dianoetik, 278[2].
dianoetisch, 278[2].
Diathese, 279[1].
Dichromatismus, 279[2].
Dichtigkeit, ii. 567[2].
Dichtungen (orphische), ii. 250[1].
Dienstbarkeit, ii. 523[1].
(Dienst-)Leistungen, ii. 522[1].
Diesheit, ii. 695[2].
Differential-Rechnung, 150[1].
Differenz, 280[2].
Differenzierung, 281[1].
Differenzton, 281[1].
Dilemma, 281[2].
Dimorphismus, 282[1].
Ding, ii. 695[1]; 456[1].
Ding an sich, **282**[1], 528[1], *39*[1], *594*[2], *595*[2], *596*, *633*[1].
Dinge der Aussenwelt, 365[1].
Dioptrik, 282[1].
Dipsomanie, 283[2].
Disciplin, 284[1].
Disconto, 284[1].
discret, 284[2].
discursiv, 285[1].
Disharmonie, 285[2].
disjunctiv, 286[1].
disparat, 286[2].
Dispensation, 287[1].
Disposition, 287[2], ii. *679*[2].
dispositionsfähig, 204[2].
dispositionsfähig (nicht), ii. 181[1].
Dispositionsunfähigkeit, 528[2].
Dissonanz, 284[1], 288[2].
Dissoziation, 288[1].
Distinction, 284[2].
Distribution, 289[1].
Dogma, 291[2].
Dogmatik, 292[2].
dogmatische Theologie, ii. 692[2].
Dogmatismus, 292[2].
Dogmen der katholischen Kirche, ii. 478[2].
Doketismus, 291[1].
dolichocephal, 293[1].
Dolus, 293[1].
Dominikaner, 294[1].
Domizil, 294[1].
Donatisten, 294[2].
Donders'sches Gesetz (der Augenbewegungen), 295[1].
Doppelbilder, 296[1].
Doppelsehen, 283[1].
Dotterhöhle, 121[1].
Drehpunkt (des Auges), 170[1].
Drehschwindel, 291[1].
Drehungsempfindung, ii. 480[1].
dreieinige Gott (der), ii. 715[2].
Dreieinigkeit, ii. 715[2].
Dreieinigkeitslehre, ii. 715[2].
Dreiklang, ii. 714[2].
Dreitheilung, ii. 715[1].
Dressur, ii. **679**[2].
Druckempfindung, ii. 337[1].
Druckpunkt, ii. 337[1].
Drüse, 414[2].
Dummheit, 300[1].
Dur, ii. 37[1].
Durchmesser, 278[2].
Durchschnitt, ii. 56[1].
Dynamik, 302[1].
Dynamik (soziale), ii. 534[2].
dynamische Oekonomik, 301[2].
Dynamogenesis, 302[1].
Dyophysiten, 302[2].
Dyotheletismus, 303[1].
Dys-, 303[2].

Ebioniten, 304[1].
Eccentricität, 305[1].
Eclampsie, 305[2].
Echolalie, 305[1].
Echosprache, 305[1].
Echtheit, 92.
Edelsinn, 409[1].
Egoismus, 312[2].
Ehe, ii. 43[2].
Ehelosigkeit, 168[1].
Ehre, 484[2].
Ehrlichkeit, 484[2].
Ei, ii. 252[2].

Eifersucht, 578[1].
Eigenarten (geistige), ii. 721[2].
Eigenlicht der Netzhaut, 510[1].
Eigenliebe, ii. 510[2].
Eigennutz, ii. 510[1].
Eigenschaft, 10[1], 90[1], ii. 359[2]; 456[1].
Eigentum, ii. 360.
Eigentumsrecht, ii. 360[2].
Eigenwerthe, ii. *824*[2].
ein Anderes, 462[1].
Einbildungskraft, 517[1], *593*[1], *594*[1], 592[2], 594[1], 597[1].
eindeutige Zuordnung, *518*[2].
Eindrillung, ii. **679**[2].
Eindruck, 526[1], *365*[1].
Eine (das), ii. 201[1].
einfach, ii. 531[1].
Einfachheit, ii. 532[1].
Einfluss, 546[1].
Einförmigkeit, ii. 726[2].
Einfühlen, ii. *640*[1].
Einfühlung, **312**[2], ii. **679**[2], ii. 268[1], 521[1].
eingeboren, 548[2].
Eingebung, 555[1], ii. 35[1].
Eingebung (vollkommene), ii. 305[1].
eingeschaltete Neuronen, ii. 412[2].
Eingeweidewürmer, 327[1].
Einhändigung, ii. 708[2].
Einheit, 492[1], ii. 731[2], 734[1]; *161*[1], *456*[2], 464[2].
Einheit (methodische), ii. 76[2].
Einheit (negative), *459*[1].
Einheit (soziale), ii. 541[1].
Einheit der Apperception, *593*[2].
Einheit der möglichen Erfahrung, *594*[2].
Einheit des Bewusstseins, ii. 68[1].
Einheit in der Mannigfaltigkeit, ii. 736[2].
einige, ii. 555[2].
Einklang, ii. 731[2].
einleuchtend, 351[2].
Eins und Viele, ii. 201[1].
eins (wesentlich), *595*[1].
Einsicht, 554[1].
Einstellung, ii. **679**[2]; 88[2], *287*[2].
Einstülpung, 570[2].
Einteilung, 205[1].
Eintheilung, 189[1], 290[2].
Eintheilungsgrund, 398[1].
Eintheilungsprinzip, 398[1].
Einüben (-ung), 357[2].
Einübung, 436[1], ii. 681[1]; *287*[2].
Einwand, *see* Einwendung.
Einwendung (Einwand), ii. 192[2].
Einwirkung und Gegenwirkung, 12[2].
Einzelheit, 539[1].
einzellige Organismen, ii. 726[1].
einzelliges Tier, ii. 373[1].
einzeln, ii. 533[1].
einzeln (Wesen, &c.), 534[1].
Einzelnheit, *464*[2].
Eitelkeit, ii. 338[1].
Ejekt, 312[2].
Eklekticismus, 305[2].
Ekstase, 309[1].
Ektoplasma, 310[1].
elektrische Organe, 313[1].
Elektrobiologie, 313[2].
Element, 313[2].
elementares Gefühl, 21[2].
Elementarlehre (transcendentale), ii. *21*[2].
Elemente, ii. 117[2].
Elemente (motorische), ii. 520[1].
Elemente (sensorische), ii. 520[1].
Elimination, 313[2].
Emanation, 314[1].
Emancipation, 314[2].
Embryo, 314[2].
Embryologie, 315[2].
Emmetropismus, 316[2].
Empfänglichkeit, ii. 429[2].
Empfängniss, 520[1].
Empfindlichkeit, 19[2], ii. 517[2], 519[1], ii. *681*[1].
Empfindlichkeit (Störungen der), ii. 517[2].
empfindsam, ii. **680**[1].
Empfindsamkeit, ii. **680**[1], ii. 517[2].
Empfindung, 600[1], ii. 515[2]; *378*[1].
Empfindung (negative), ii. 149[1].
Empfindung (statische), ii. 600[2].
Empfindung der Schwere, ii. 812[2].
Empfindung des Gleichgewichts, 338[1].
Empfindungen (subjektive), ii. 610[2].
Empfindungskreis, ii. 519[2].
Empfindungs-Schwelle, ii. 696[2].
Empiriokriticismus, 321[1].
empirisch, *56*[1].
empirische Allgemeinheit, ii. *739*[2].
empirische Anschauung, *569*[1].
empirische Logik, 318[2].
empirische Psychologie, ii. 389[1].
Empirismus, 321[1].
Encyclopädie, 322[1].
Encyclopädisten, 322[1].
End-(glied, &c.), ii. 723[2].
Endbäumchen, 65[2].
Ende, 323[2].
endlich, 383[2].
Endomusie, *564*[1].
Endophasie, *564*[1].
Endorgan, 324[1].
Endothel, 324[2].
Endplatte, 324[2].
Endzustand, 324[2].
Energie, 325[1].
Energie der Nerven (specifische), ii. 567[2].
Energismus, 324[2].
Engel, 46[2].
Engel'sches Gesetz, 326[2].
Engerung des Bewusstseins, ii. *619*[1]; 207[2].
Entdeckung, 284[2], 572[2].
entfrommte Werthe, ii. *825*[1].
Entgegensetzen, ii. 181[1].
Enthusiasten, 327[1].
Enthymem, 327[2].
entoptische Erscheinungen (*or* Phänomene), 327[2].
Entsagung, ii. 468[1].
Entschädigung, 530[1].
Entscheidung, 65[1], 97[2], ii. 468[2].
Entschluss, ii. 678[2].
Entwicklung, 274[2], 353[1].
Entwicklung (ontogenetische), ii. 202[1].
Entwicklung (seelische), ii. 67[1].
Entwicklung (soziale), ii. 535[2].
Entwicklung (sprunghafte), ii. 484[2].
Entwicklungsgeschichte, 315[2].
Entwicklungsmechanik, 276[1].
Entwicklungspsychosen, 275[1].
Entzückung, ii. 709[2].
Entzündung, 545[2].
Epagoge, 329[1].
Ependym, 324[2].
Ependymium, 324[2].
Epicherem, 329[1].
Epicurismus, 329[1].
Epicyklen-Theorie, ii. 794[2].
Epidemie, 330[1].
Epigenese, 330[1].
Epilepsie, 330[2], 577[1].
Epiphania, 333[1].
Episyllogismus, 337[1].
Epithel, 337[1].
Erastianismus, 339[1].
Erbbesitz, ii. 675[1].
Erbschaft, 546[2].
Erbsünde, ii. 250[1].
Erbtheil, 546[2].
Erbübung, ii. 744[2].
Erdgeist, *96*[2].
Erdichtung, 570[2].
Ereigniss, 351[1].
Ereignisse der Aussenwelt, 365[1].
Erfahrung, 40[2], 360[2], *594*[2], *597*[1].
Erfahrung (Einheit der möglichen), *594*[2].
Erfahrung (reine), ii. 402[2].
Erfindung, 570[2].
ergänzend, 557[2].
Ergebniss, ii. 470[1].
erhaben, ii. 611[2].
Erhaltung, ii. 511[2].
Erhaltungs-Glieder, ii. *824*[2].
erhebende Erklärung, 40[1].
Erhebungswinkel (des Blickes), 47[1].
Erholung, ii. 433[1].
Erinnerung, 386[1], ii. 63[1].
Erkenntniss, 602[2], *56*[1], ii. 204[2].
Erkenntniss (Relativität der), ii. 450[2].
Erkenntniss (transcendentale), *595*[1].
Erkenntniss (-Vermögen) 192[2].
Erkenntniss der individuellen Identität, 504[2].
Erkenntniss der inhaltlichen Identität, 505[2].
Erkenntniss einer Aussenwelt, 365[2].
Erkenntnissart, *595*[1].
Erkenntnisslehre, 414[2].

Erkenntnisstheorie, 333², ii. *21*², ii. 259².
Erkenntnissvermögen, *591*², 592¹, 593².
Erkenntnissvermögen (intellectuelles), *591*².
Erkenntnissvermögen (oberes), *591*².
Erkennungsmittel, ii. 420¹.
Erkennungszeichen, ii. 432².
Erklärung, 40¹, 362², 564².
Erlangung, 62¹.
Erlassung, 287¹.
Erlöser, ii. 434¹.
Erlösung, ii. 434¹, 484².
Erlösungslehre, ii. 557¹.
Ermüdung, 374².
Ernährung, ii. 190².
Erneuerung, 570².
Erniedrigung Christi, 487².
Erotomanie, 340¹.
Erregbarkeit, ii. 519¹.
Erregung, 356¹.
Erregungen (seelische), ii. *724*².
Erregungszustand, 339².
Erröthen, 123².
Erscheinung, 327², ii. 289¹.
Erscheinung (Schein und), ii. *514*¹.
Erscheinung Christi, 333¹.
Erscheinungen, *594*², *596*¹, 595².
Erscheinungen (geistige), ii. 680².
Erschöpfung, ii. 370².
Ersitzung, ii. 332¹.
erst, ii. 340¹, 341¹.
Ertrag, ii. 471¹.
Erwartung, 56¹, 359².
Erweiterungsurteil, 38¹.
Erwerb, 304¹.
erworben, 9².
erworbene Eigenschaften, 10¹.
erziehender Unterricht, 310¹.
Erziehung, 284¹, 310¹.
Es existirt, 461².
Es ist, 461².
Es ist an ihm, 460¹.
Es ist nichts daran, 460¹.
Es ist wirklich, 461².
Eschatologie, 341¹.
esoterisch, 341¹.
Essener, 341².
Ethik, 346¹, 510¹, 569².
Ethik (Methoden der), ii. 76¹.
Ethik (soziale), ii. 535¹.
Ethik (theologische), ii. 692².
ethische Billigung, 63².
ethische Theorien, 343¹.
Ethnographie, 348¹.
Ethnologie, 348¹.
Ethologie, 348².
Ethos, 349¹.
Etwas, 460², 462¹, 596², ii. 485¹.
Etwas antagonistisches, ii. 790¹.
Etwas hat an ihm, 460¹.
Etymologie, 349¹.
Eucharistie, 349².
Eudämonismus, 350¹.
Eusebianer, 351¹.
Eutychianismus, 351¹.
Evangelium, 417¹.
evident, 351².
Evidenz, 351², 352¹.
Evocation, 353¹.
Evolution, 353¹, 368¹.
ewig (zeitlich und), ii. 673².
ewige Schöpfung, 342¹.
Ewigkeit, 342¹.
Ewigkeit Gottes, 342².
exakte Logik, ii. 23².
exakte Wissenschaft, ii. 299², 499¹.
Exaltation, 355¹.
excentrische Projection, 304².
Excommunikation, 357¹.
Executiv, 357¹.
Exegese, 357².
Existential-Satz, 359¹.
Existenz, *462*, 461², 462, 464¹, ii. 91².
existirt (Es), 461².
Exogamie, 359¹.
Exorcismus, 359².
exoterisch, 341¹.
Experiment, 362¹.
experimentelle Psychologie, ii. 389¹.
Experimentiren, 362².
explicit, 525².
Extirpation, 366¹.

Factor, 368¹.
Factoren der Evolution, 368¹.
Factoren der Produktion, 368².
Fähigkeit, 2¹, 153².
Fähigkeit (moralische), ii. 104¹.
Fahrlässigkeit, ii. 149¹.
Fallacie, 372¹.
fallende Produktivität, 281².
Fallsucht, 330².
falsch, 373².
falsch-, ii. 374².
Falschheit, 373².
Falschheit (Wahrheit und), ii. 716².
Familie, 373².
Fanatismus, 374¹.
Farbe, 194², *146*².
Farben (Theorie der Wahrnehmung der), ii. 779².
Farbenblindheit, 195¹.
Farbendreieck, 197².
Farbenempfindung, 197¹, ii. 781¹.
Farbenkreis, 196².
Farbenlehre, 181², ii. 779².
Farbenmischung, 196², 197¹.
Farbentafel, 196².
Farbenton, 197¹.
farbiges Hören, 91¹.
Fechner'sche Gesetz (das), 376².
Fegefeuer, ii. 402².
Fehdepflicht, 33².
Fehler, 372¹, 375².
Feminismus, 311¹.
Fensterversuch (seitlicher), ii. 527¹.
Ferrier'scher Versuch, 379¹.
Fetisch, 380¹.
Fetischismus, 380¹.
Feueranbetung (-cult), 383².
Figur, 382¹.
Figur (logische), ii. 28¹.
Finanz, 383².
Fissur, 384¹.
Fixationspunkt, 386¹.
fixe Idee, 386¹.
Fixiren der Erinnerungen, 386¹.
Flackern, 386².
Flattern, 386².
Fleck, 121².
fleischlich, ii. 520².
fleischlich (geistlich und), ii. 587¹.
Fleischwerdung, 528².
fliegende Mücken, ii. 118².
Fliehkraft, 170¹.
Flimmern, 386².
flüssiges Kapital, 183¹.
Folgerichtigkeit, ii. *689*¹.
Forderung, ii. 315².
Form, 390².
Formaldisciplinen, 391².
formale Bildung, 392¹.
formale Logik, 392¹.
formale Stufen, 393².
Formalismus, 390².
Fortpflanzung, 24¹, 404².
Fortpflanzung (geschlechtliche), ii. 525¹.
fortschreitend, ii. 358¹.
Fortschritt, ii. 358¹.
Fortschritt (sittlicher), ii. 105².
Fortschritt (sozialer), ii. 535².
Fourier'sches Gesetz, 394¹.
Franziskaner, 394².
Fraunhofer'sche Linien, 395¹.
frei, 395.
Freibrief, 175¹.
Freidenken, 396².
Freidenker, 396².
Freiheit, 394¹, 395¹, ii. 4¹.
Freiheitsgefühl, 396¹.
Freilassung, 314².
Freude, 580¹.
Freundschaft, 396².
Friede, ii. 274².
Fröhlichkeit, 488¹.
Fruchtbarkeit, 379².
Frühreife, ii. 324¹.
Fühlhorn, 51¹.
Fundament, ii. 481¹, 678².
fundirte Inhalt (der), *391*².
Fundirung, 398¹.
Fünklein, ii. 124².
Funktion, 397², 626¹.
Funktion (trophische), ii. 716¹.
für sich, *461*¹, 459¹.
für sich (an und), *461*¹, 459¹.
Fürsichsein, *461*¹, 459¹, 462².
für uns (an sich oder), *461*², 459¹.
Fürbitte, 562¹.
Furche, 384¹.
Furcht, 375².
Furchungshöhle, 121¹.
Furchungskugel, 121¹.
Für-wahr-halten, 110².

Gallikanismus, 400¹.
Ganglienplexus, 405¹.
Ganglienzelle, 405¹.

Ganglioblast, 404[2].
Ganglion, 405[1].
gangliöses Geflecht, 405[1].
ganz, 557[2].
Ganze (das), ii. 814[1].
Ganzschluss, 149[2].
Gastrulatheorie, 405[2].
Gattung, 600[1].
Gattungswesen, 201[1].
Gattungswille, 201[1].
Gebärdensprache, 413[1].
Gebet, ii. 323[1].
Gebilde, 205[2].
Gebrauch, 273[1], ii. 744[1].
Gebrauch und Nicht-Gebrauch, ii. 744.
Gebrauchsvererbung, ii. 744[2].
Gedächtniss, ii. 63[1].
Gedächtniss (organisches), ii. 213[2].
Gedächtnisskunst, ii. 89[1].
Gedanke, ii. 183[2], *463*[1], 464[1].
Gedankenlesen, ii. 120[1].
Gedankenübertragung, ii. 696[2].
Geeignetheit, 385[1].
Gefässcentrum, ii. 759[2].
Gefässnerven, ii. 759[2].
Gefässsystem, ii. 760[1].
Geflecht, 405[1].
Gefühl, 21[2], 317[1], 377[1], 592[1], *22*[1], *378*[1].
Gefühl (ästhetisches), ii. 521[2].
Gefühl (geschlechtliches), ii. 525[1].
Gefühl (höheres), ii. 521[1].
Gefühl (sittliches), ii. 106[1].
Gefühl der Lust und Unlust (das), *591*[2].
Gefühl der Uebereinstimmung, 384[2].
Gefühlsaesthetik, 33[1].
Gefühlsdisposition, 317[2], *317*[1].
Gefühlslage, *22*[1].
gefühlsregend, 19[2].
Gefühlston, 23[1], *21*[2], *453*[2].
Gegebene (das), 414[1].
Gegebensein, ii. 117[2].
Gegenfarbe, 51[1].
Gegenforderung, 202[2].
gegenseitige Anpassung, 190[1].
gegenseitige Nachfrage, ii. 429[2].
Gegenseitigkeit, ii. 124[1].
Gegenstand, ii. 191[1].
Gegenstand (transcendentaler), *596*[2], 596[1].
Gegenstände des Denkens, 637[1].
Gegenstände des Lebensbedarfs, ii. 143[1].
gegenständlich, ii. 191[1].
Gegenwirkung, 12[2], 162[2], ii. 205[2].
geheim, ii. 343[1].
Gehirn, 126[1].
Gehör, 443[1].
gehörig (zur Sache), ii. 287[1].
Gehorsam, ii. 191[1].
Gehörsempfindung, 451[1].
Gehörsempfindungen (Lokalisation der), ii. 20[1].
Geist, ii. **680**; 482[2], ii. 81[2], 584[2], ii. *81*[2], ii. 82[2], 681[2].
Geist (und Körper), ii. 82[2].
Geistes-(wissenschaften, &c.), ii. 320[1].
Geisteserscheinung, 61[1].
Geistesstörung, 2[1], 33[1], ii. 680[2].
Geisteswissenschaften, ii. 105[2], ii. *680*[2].
geistige Abnormität, 50[1].
geistige Eigenarten, ii. 721[2].
geistige Entwicklung, 354[2].
geistige Epidemie, 330[1].
geistige Erscheinungen, ii. 680[2].
geistige Evolution, 354[2].
geistiger Sinn, ii. 517[1].
geistiges Leben, ii. 6[1].
geistlich und fleischlich, ii. 587[1].
Geistlichkeit, ii. 587[1].
Geld, ii. 99[2].
Geldumlauf, 183[2].
Gelegenheitsursache (Theorie der), ii. 199[1].
Gelenkempfindung, 73[2], 572[2].
Gelüst, ii. 32[2].
Gemein, ii. **680**[1], 199[2].
Gemeinbild, 408[2].
Gemeinde, 200[2].
Gemeinempfindung, 192[2], 199[2].
gemeine Sätze, ii. *739*[1].
Gemeinheit, 200[2].
Gemeinrecht, ii. 744[1].
gemeinsame Kosten, 579[2].
Gemeinschaft, 200[2], 201[1], *407*[2].
Gemeinsinn, 200[1].
Gemeinwesen, ii. 396[1].
Gemüth, ii. **680**[1]; *317*[1], *592*[2].
Gemüths-, ii. **680**[1]; *206*[2], ii. *678*[1].
(Gemüths-, &c.) Typen, ii. 721[2].
Gemüthsbewegung, *22*[1], *317*[1].
Gemüthserregung, 356[1], *317*[1].
Gemüthslage, *22*[1].
Gemüthszustand, *22*[1], *317*[1].
Genehmigung, 321[2].
generale Sätze, ii. *739*[1].
Generationswechsel, 35[1].
generisch, 408[2].
Genese, 409[2].
genetisch, 409[2].
genetische Methode, 409[2].
genetische Psychologie, 410[1].
genetische Selektion, ii. 465[2].
Genie, 410[1].
Genius, 410[1].
Genoss, ii. 548[2].
Geometrie, 412[1].
Geräusch, ii. 179[1].
Gerechtigkeit, 338[2], 585[1], ii. 474[2].
Gericht, 583[2] f.
gerichtlich, 390[1], 584[1].
gerichtliche Zuerkennung, 16[2].
Gerichtsstand, 393[2].
Germinalselektion, 412[1].
Geruch, ii. 489[1].
Geruchsempfindungen, ii. 200[2].
Gesammt-, ii. **680**[1].
Gesammtbild, ii. *680*[1].
Gesammtpersönlichkeit, ii. 715[1].
Gesammtstreben, 407[2].
Gesammttrieb, *407*[2].
Gesammtvorstellung, *25*[2], ii. *184*[2], *680*[1].
Gesammtwille, 407[1], ii. *680*[1].
Geschäftsführer, 25[1].
Geschichte (Philosophie der), ii. *595*[1].
Geschlecht, 405[2], ii. 523[2].
geschlechtliche Fortpflanzung, 404[2], ii. 525[1].
geschlechtliche Zuchtwahl, ii. 525[1].
geschlechtliches Gefühl, ii. 525[1].
Geschlechtscharactere, ii. 524[1].
Geschlechtsreife, ii. 396[1].
Geschmack, ii. 662[1].
Geschmacksempfindungen, ii. 662[2].
Gesell, ii. 548[2].
Geselligkeit, ii. 543[1].
Gesellschaft, 79[1], 201[1], ii. 543[2]; *407*[2].
Gesellschaft (bürgerliche), ii. 597[1].
Gesellschaftlichkeit, ii. 543[1].
Gesetz, 100[1], 295[1], 306[1], 326[2], 376[2], 394[1], 431[1], 639[2] f., ii. 601[2].
Gesetz (Malthus'sches), ii. 38[2].
Gesetz (Talbot-Plateau'sches), ii. 661[1].
Gesetz (Waller'sches), ii. 810[2].
Gesetz (Weber'sches), ii. 812[1].
Gesetz der constanten Orientirung, ii. 242[2].
Gesetz der Relativität, ii. 450[2].
Gesetz des menschlichen Verkehrs, 306[1].
Gesetzbuch, 190[2].
Gesetzentwurf, 117[1].
Gesetzerlassung, 321[2].
Gesetzeslehre, ii. 180[1].
Gesetzgebung, ii. 2[2].
gesetzlich, ii. 2[1].
(gesetzliche) Moralität, ii. 111[1].
gesetzmässig, ii. 2[2].
Gesetzsammlung, 190[2].
gesetzt, ii. 310[2]; *461*[1], 459[1], 461[2].
Gesetztes, *461*[1].
Gesetztsein, *461*[1].
Gesetzvorschlag, 117[1].
Gesicht, ii. 765[1].
Gesichtsempfindung, ii. 781[1].
Gesichtsfeld (Gesichtskreis), 382[1].
Gesichtslinie, ii. 8[1], 801[1].
Gesichtsstörungen, ii. 799[1].
Gesichtswinkel, 367[1].
Gesindel, ii. *89*[1].
Gesinnung, ii. **680**[1]; *561*[1].
Gespenst, 61[1], 413[2], ii. 568[1].
Gestaltsqualität, 391[2], ii. *678*[1].
gesund, ii. 487[2].
Gesundheit, ii. 487[2].
Gewebe, ii. 705[2].
Gewebe (soziales), ii. 541[1].
Gewerbe, 540[2].
gewerbthätig, 540[2].
Gewerkverein, ii. 708[1].
Gewicht (specifisches), ii. 567[2].
Gewinn, 281[2].

Gewissen, ii. 456[1].
Gewissensbiss, ii. 463[1].
Gewissheit, 170[2], 171[1].
Gewohnheit, 435[1].
Gewöhnung, 436[1].
Gewollte (das), ii. *681*[2].
Glanz, ii. 32[2].
Glätte, ii. 480[1].
Glattempfindung, ii. 480[1].
Glaube, 42[2], 110[2], 112[2], 369[2], ii. 456[1].
Glauben (Wille zum), ii. 818[1].
Glaubensbekenntniss, 84[1].
Glaubensgericht, 549[2].
Glaubenslehre, ii. 301[2].
Glaubensphilosophie, 370[2].
Glaubensverordnung, ii. 482[1].
gleichartig, ii. 530[2]; 286[2].
Gleiche (das) und (das) Andere, ii. 484[2].
Gleichförmigkeit, ii. 726[2].
Gleichgewicht, 100[1], 337[2], 338[1].
Gleichgewicht (unbeständiges), ii. 743[2].
Gleichgültigkeit, 532[2].
Gleichheit, 27[2], 337[1], ii. 263[2].
Gleichung (persönliche), ii. 283[1].
Glück, 378[2], 422[1], 441[1].
glückbringend, 378[2].
Glückseligkeit, 350[2].
Glückseligkeit (allgemeine), ii. 741[2].
Glückspiel, 403[1].
Gnade, 419[1], ii. 69[1].
Gnomiker (die), ii. 818[2].
Gnosiologie, 414[2].
Gnosis, 414[2].
Gnosticismus, 414[2].
gnostisch, 414[2].
goldene Regel, 416[1].
goldener Schnitt, 416[1].
Goldpuppe, 182[1].
Gott, 342[2], 415[1].
Gott (der dreieinige), ii. 715[2].
Gott (innige Verbindung mit), ii. 692[1].
Gottes Unumschränktheit, ii. 558[2].
Gotteseinheit, ii. 737[1].
Gotteslästerung, 120[2].
Gottessohn, ii. 556[1].
Gottesverehrung, ii. 822[2].
Gottheit, 415[2].
göttliche Eigenschaften, 90[1].
göttliche Regierung, 418[2].
göttlicher Typus, 290[1].
göttliches Recht, 290[1].
Grammatik, 419[2].
graphische Methode, 420[1].
Graphologie, 420[2]
grau, ii. 793[2].
Gravitation, 421[2].
Greisenhaftigkeit, ii. 514[2].
Grenzbegriff, ii. 7[1].
Grenze, ii. 7[1].
Grenzfrommen, ii. *825*[1].
Grenznutzen, 383[1].
Grenzwerthe, ii. 7[2].
Gresham'sches Gesetz, 431[1].
Griechen (Philosophenschulen der), ii. 495[2].
Grösse, 559[2], ii. 36[2].
Grössenwahn, 420[1].
grotesk, 431[2].
Grübelsucht, 296[2].
Grünblindheit, *279*[2].
Grund, 432[1], ii. 425[2], ii. *92*[2]; 462[1].
Grund (Satz vom zureichenden), ii. 616[1].
Grundfarbe, 195[1].
Grundfarben, ii. *790*[2].
Grundgesetz, 302[1].
Grundsatz, 97[2], 118[1], ii. 55[2]; *597*[1].
Grundsatz des ausgeschlossenen Dritten (*or* Mitte), 356[2].
Grundsatz des reinen Denkens, 56[1].
Grundsätze (a priori), *594*[2].
Grundton, 397[2], ii. 341[1].
Grundwahrheit, 397[2].
Gruppe, 432[1].
Gruppenauslese, 433[1].
Gruppenselektion, 433[1].
Gültigkeit, ii. 748[2].
Gültigkeitsbereich, ii. *644*[1].
Gut, 199[1], 416[2].
Gute (das), 417[1].
Güter, 417[1].

Habitus, *435*[2].
Habsucht, 11[1].
Haftbarkeit, ii. 3[2].
halbbewusst, ii. 606[1].
halber Ton, 181[1].
Halbpachtsystem, ii. 74[1].
Halbschlaf-(Zustand), 489[2].
Halbschluss, 149[2].
Halbton, 181[1].
Hallucination, 437[2].
Haltung, 88[2].
Handdeuterei, ii. 255[1].
Handel, ii. 708[1].
handeln, 101[1].
Handelsbilanz, 100[2].
Handlung, 11[2], 285[2], 575[1].
Handlung wider besseres Wissen, 575[1].
Handlungsbegründung, ii. 485[2].
Handschrift, 440[2].
Handschriftenkunde, 420[2].
Hang, ii. 359[2].
Haptik, 441[1].
Harmonie, 441[2].
Harmonie (prästabilirte), ii. 329[2].
harmonische Obertöne, 441[2].
Hass, 442[2].
hässlich, ii. 723[1].
Haubenfeld, ii. 663[2].
Haufen, 26[1].
Haupt-(in compounds, as Hauptergebniss), ii. 341[2].
Hauptschuldner, ii. 341[2].
Hauptverbrecher, ii. 341[2].
Haus-(Industrie), 293[2].
Hausthiere, 293[2].
Haut, ii. 663[2].
Hautempfindung, ii. 533[1].
Hazardspiel, 403[1].
Hedonismus, 454[1].
Hedonismus (universalistischer), ii. 742[1].
Heide, 453[1].
Heiland, ii. 488[2].
heilige Schrift, ii. 503[2].
heilige Schriften, ii. 484[1].
Heiligenlegenden, 437[1].
heiliger Geist, 482[2].
heiliges Abendmahl, 349[1].
Heiligkeit (Gottes), 482[2].
Heiligsprechung, 153[2].
Heiligung, ii. 485[1].
heimisch, 293[2].
Helligkeit, 146[2].
Helligkeitsunterschiede, *146*[2].
Hellsehkunst, 184[1].
Hellsichtigkeit, 184[1], ii. 31[2].
Hemmung, 546 f.
Herdeninstinkt, 430[2].
Herrscher-Philosoph, ii. 290[1].
Herz, 453[1].
Heterochronie, 7[1].
Heterogenität, 483[2].
Himmel, 453[2].
Himmelfahrt, 81[1].
Hindeutung, ii. 565[1].
hinreichende Bedingung, ii. 143[1].
Hirn, 126[1].
Hirnbläschen, 170[2].
Hirnhaut, ii. 67[1].
Hirnhautentzündung, ii. 67[1].
His (Längszonen von), ii. 828[2].
höchstes Glück, 422[1].
Hochverrat, ii. 3[1].
Hoffnung, 485[2].
Hoffnung auf den Messias, ii. 71[1].
Höflichkeit, 199[1].
Höhenfurcht, *11*[1].
Hohenmacht, *12*[1].
höhere Gefühle, *317*[1].
höheres Gefühl, ii. 521[1].
Hohlraum, ii. 760[2].
holoblastisch, 482[2].
Homogamie, 483[2].
Homogenität, 483[2].
homolekithal, 484[1].
homologe Organe, 484[1].
homonym, 484[1].
Homoousia, 484[2].
Homotaxie, 484[2].
Horde, 486[1].
Hördefekte, 452[1].
Hören, 91[1], 117[2].
Hornblatt, 329[1].
Horopter, 486[1].
Hülfssatz, ii. 3[1].
Humanismus, 486[2].
Humor, 488[1].
Hundswuth, ii. 413[1].
Hydrocephalus, 488[2].
Hylozoismus, 489[1].
Hypertrophie, 489[2].
hypnagogisch, 489[2].
hypnogen, 490[1].
Hypnose, 490[1].
Hypnotismus, 490[2].
Hypochondrie, 491[1].
Hypometropie, 489[2].
Hypothese, 492[1].

hypothetisch, 492[2].
Hysterie, 494[1].
Hystero-Epilepsie, 496[2].

Ich denke, *593*[2], *594*[2], ii. *68*[2].
ideal, 499[1].
Idealisierung, 504[1].
Idealismus, 500[2].
Idealität, 504[1].
Ideal-Realismus, ii. 421[2].
Idee, 78[1], 386[1], 498[1], 548[2], ii. 464[2].
Idee (die), *463*[1], *465*[1], 456[1], 463[2].
Idee Gottes, 415[1].
identische Punkte, 504[1].
Identität, 504[2] f.
Identität (persönliche), ii. 283[2].
Identitätsphilosophie, 506[2].
Ideogramm, 507[1].
Ideologie, 507[2].
ideomotorisch, 507[2].
ideomotorisches Grundgesetz, 302[1].
Ideoplasie, 507[2].
ideoplastisch, 507[2].
idiopathisch, 510[1].
Idioplasma, 510[1].
idiopsychologische Ethik, 510[1].
Idiosynkrasie, 510[2].
Idiotie, 507[2].
Idol, 510[2].
ihm (an), *460*[1], 459[1].
Illusion, 511[2].
im Sinne haben, 560[1].
Imbecillität, 519[1].
immanente Ausdehnung, *365*[1].
immanente Philosophie, 520[2].
Immanenz, 520[2].
Immaterialismus, 520[2].
Immoralität, 286[1].
Imperatio, 160[1].
implicit, 525[2].
Implikation, 525[2].
Impressionismus, 526[1].
impulsleitend, 601[2].
Inbegriff, ii. **680**[1], ii. 816[1].
Incohärenz, 529[1].
Indemnität, 530[1].
Indeterminismus, 530[2].
Index, 531[1].
Indexzahl, 532[2].
Indifferenzpunkt, 533[1].
indirekte Selektion, ii. 213[2].
indirektes Sehen, 533[2].
Individualismus, 538[2].
individualistisch, 539[1].
Individualität, 539[1].
Individualpsychologie, 538[2].
individuell, 504[2], 534[1], ii. 533[1].
individuell erworbene Abänderung, ii. 94[1].
Individuum, 534[1].
Induction, 539[1].
Industrialismus, 540[2].
Industrie, 293[2], 540[2].
Industrie (lokalisirte), ii. 20[2].
industriell, 540[2].
Industriesystem, 540[2].
infinitesimal, 545[1].
Inflation, 546[1].
Inflexion, 546[1].
Infralapsarianismus, 546[1].
Inhalt, 206[1], *390*[2], *391*[2].
inhaltlich, 505[2].
Inhärenz, 546[2].
Inhibition, 547[2].
Initiative, 548[2].
inner, 564[1].
innere Wahrnehmung, 567[2].
innerer Sinn, *592*[2].
innerer Werth, 566[1].
inneres Keimblatt, 324[1], 491[1].
inneres Singen, 564[1].
inneres Sprechen, 564[1].
innerlich, 566[1].
innerliche Beobachtung, ii. 198[1].
Innervationsempfindung, 549[1].
innige Verbindung mit Gott, ii. 692[1].
Inquisition, 549[2].
Insekten, 553[2].
Instinkt, 555[2].
instinktive Moralität, 556[1].
Institut für experimentelle Psychologie, 605[1].
Institution, 556[2].
Instrumente, 605[1].
Integral-Rechnung, 150[1].
Intellectualismus, 559[1].
intellectuelles Erkenntnissvermögen, *591*[2].
Intensität, 559[2].
Intensität der Lichtempfindung, 146[2].
intensive Grösse, 559[2].
Interesse, 562[1].
Interessen-Harmonien, 306[1].
Interferenz, 563[1].
Intermittenzton, 563[2].
Interpretation, 564[2].
intersubjektiv, 565[1].
Intervall, 565[1].
Intraselection, 565[2].
Introjection, 566[1].
Intuition, ii. **680**[2]; 568[1].
Intuitionismus, 570[1].
Intuitions-Ethik, 569[2].
Involution, 574[1].
Ironie, 574[2].
Irradiation, 574[2].
Irrenarzt, 33[1].
Irresein, 35[1].
Irresein (periodisches), ii. 279[2].
Irrsinn, 2[1], ii. 32[2].
Irrsinn (moralischer), ii. 104[1].
Irrthum, ii. 716[2].
Islam (Mahomedanismus), ii. 95[1].
Isolirung, 576[1].
ist (Es), 461[2].

Jackson'sche Epilepsie, 577[1].
Jackson'sche Wiederentwicklung, 577[1].
Jansenismus, 577[2].
Jesuitismus, 579[1].
Judenthum, 580[1].
Jünglingsalter, 17[2].
jüngstes Gericht, 584[1].
Jurisdiction, 393[2], 584[2].
Jurisprudenz, 584[2].
Jurist, 585[1].
juristisch, 584[1].

Kabbala, 149[1].
Kakodämonie, 149[2].
kaltblütige Thiere, 193[1].
Kältepunkt, 193[1], ii. 673[1].
Kampf der Theile, ii. **604**[2]; 565[2].
Kampf ums Dasein, 358[1].
Kanon, 152[2].
Kanonisation, 153[2].
kanonisches Recht, 153[1].
Kantianismus, 588[1].
Kapazität, 153[2].
Kapital, 154[1], 183[1], 386[1].
Kapitalanlage, 573[2].
Kardinalpunkt u. -werth, 155[1].
Kardinaltugenden, 155[1].
Karikatur, 155[2].
Karyokinesis, 598[2].
Kaste, 156[2].
Kasuistik, 157[1].
Katabolismus, 598[2].
Katalepsie, 158[1].
Kataphasie, 158[2].
Kataplexie, 159[1].
Katatonie, 598[2].
kategorematisch, 159[2].
Kategorie, 160[1].
Kategorienlehre, *336*[1].
kategorisch, 159[2].
kategorischer Imperativ, 160[1].
Katharsis, 161[2].
Katheder-Sozialisten, ii. *542*[1].
Katholicismus, 163[1].
katholische Gegenwirkung, 162[2].
katholische Kirche, 162[1].
katholischen Kirche (Dogmen der), ii. 478[2].
Kehldeckel, 330[2].
Keim, 412[1], ii. 588[1].
(Keim-)Frucht, 314[2].
Keimbläschen, 412[2].
Keimblatt, 310[1], 324[1], 329[1], 491[1].
Keimblatt (mittleres), ii. 70[1].
keimen, 412[2].
Keimhaut, 121[1].
Keimplasma, 412[2].
Keimspore, ii. 588[1].
kennen, *602*[2].
Kennzeichen der Wahrheit, ii. 687[1].
Kenosis, 599[1].
Kenotismus, 599[1].
Kern, ii. 186[2].
Kettenschluss, 171[1], ii. 557[1].
Keuschheit, 175[1].
kinaesthetische Empfindung, 600[1].
kinaesthetisches Aequivalent, 599[2].
kinaesthetisches Bild, 599[2].
Kindergarten, 601[1].
Kindes (Psychologie des), 175[1].
Kindheit, 542[1].
kinesodisch, 601[2].
Kinetik, 601[2].
kinetisch, 601[2].
Kirche, 162[1], 182[1].
Kirche (Dogmen der katholischen), ii. 478[2].

Kirche und Staat, 182[2].
Kitzel, ii. 697[1].
Kitzelempfindung, 576[2].
Klage, 12[1].
Klang, 176[2], 184[2], 205[2], ii. 122[1], 183[2].
Klangfarbe, 195[1], ii. 697[1].
Klangfärbung, 195[1].
klar und deutlich, 189[1].
Klarheit, 189[1].
Klasse, 185[1].
Klassification, 185[1].
kleiner Schädelbohrer, ii. 714[2].
kleinste Dauer, 300[2].
klonisch, *190*[1].
Klugheit, ii. 374[1].
Knie, 411[2].
Kniephänomen, 602[1].
Knöspchen, 405[2].
Koefficient, 191[2].
Koexistenz, 192[2].
Koincidenz, 192[2].
koincidirende Variationen, 193[1].
Kollaps, 193[2].
Kollektivismus, 193[2].
Kolonie, 194[1].
komisch, 198[2].
Kommunismus, 200[2].
Kompensation, 202[2].
Konfession, 91[1], 102[1], 109[2].
Konkurrenz, 202[2].
Konsequenz, ii. *687*[1].
Konzentration, 207[2].
Kopfdruck, ii. *170*[1].
Koran, 603[2].
Körper, 124[1], ii. 68o[2].
Körper und Geist, ii. 82[2].
Korpsgeist, 341[1].
Kosten, 289[c], 579[2].
Kraft, 119[2], 205[1], 325[1], 388[2], ii. 318[2], 604[2].
Kraft (lebendige), ii. 801[2].
Kraft (mittlere), ii. 470[1].
Kraft (soziale), ii. 537[1].
Kraftbewusstsein, ii. 319[2].
Kräfte, ii. 764[2].
Kräfte (Parallelogram der), ii. 259[1].
Kraftempfindung, 311[2].
Kraftmoment, ii. 98[1].
krankhaft, ii. 111[2].
Krankheit, 285[1].
Kreis (Müller'scher), ii. 116[2].
kreisförmig, 183[1].
Krieg, ii. 811[2].
Kriegszustand, 113[2].
Kriminalklage, *12*[1].
Kriterium der Wahrheit, ii. 687[1].
Kritik, ii. *21*[2].
Krümmung, 386[2].
Kulturgrenze, ii. 41[2].
Kulturstufe der Ackerbauer, 28[1].
Kummer, 431[1].
Kunst, 69[2].
künstliche Auswahl (*or* Selektion), 74[1].
Kunsttheorien, 69[2].
Kunsttrieb, 73[2].
kurz-, 125[2].
kurzdauerndem Reize (Nachbild nach), ii. 433[1].
Kurzsichtigkeit, ii. 124[1], 142[2].

Lage-empfindung, ii. 311[1].
Lagereflex, 159[1].
Lallen, 616[2].
Lalo-, 616[2].
Lamarck'sche Lehre, 617[1].
Land, 618[1].
Land-Werth, 618[1].
Langeweile, 327[1].
langköpfig, 293[1].
Längszonen von His, ii. 828[2].
Larve, 628[1].
Laster, ii. 763[2].
latente Wärme, 628[1].
Latenz, 628[1].
Latenzdauer, 628[2].
Latitudinarianismus, 639[2].
Laune, 488[1].
Lautgesetze, ii. 296[2].
Lautorgane, ii. 802[1].
Leben, ii. 4[2].
Leben (geistiges), ii. 6[1].
lebendige Kraft, ii. 801[2].
lebendiger Stoff, ii. 8[2].
Lebens (Ursprung des), ii. 243[1].
Lebensbedarfs (Gegenstände des), ii. 143[1].
Lebensinhalt, 325[1].
Lebenskraft, ii. 801[2].
Lebensverhältnisse, 328[2].
Lebewesen, ii. 4[2].
Lebhaftigkeit, ii. 802[1].
Leere (das), ii. 747[1].
Legende, ii. 2[1].
legislative Genehmigung einer Acte, 321[2].
legitim, ii. 2[2].
Legitimation, ii. 2[2].
Lehen, ii. 675[1].
Lehnbarkeit (Art der), ii. 675[1].
Lehnsatz, ii. 3[1].
Lehre, 617[1].
Lehre (neupythagoreische), ii. 150[1].
Lehre der bionomischen Verhältnisse, 120[1].
Lehre der göttlichen Eigenschaften, 90[1].
Lehre der Puritaner, ii. 403[1].
Lehre der Sadducäer, ii. 484[1].
Lehre der Scholastiker, ii. 495[2].
Lehre der strengen Sabbaths-Beobachter, ii. 483[1].
Lehre der Universalisten, ii. 741[2].
Lehre des Thomas von Aquino, ii. 696[1].
Lehre von dem tausendjährigen Reich, ii. 79[1].
Lehre von Ritschl, ii. 475[2].
Lehre von Zoroaster, ii. 829[1].
Lehrerseminar, ii. 183[1].
Lehrlingswesen, 63[2].
Lehrsatz, ii. 693[1].
Lehrsatz der unbefleckten Empfängniss, 520[1].
Leib, ii. 68o[2].
Leibeshöhle, 192[1].
Leiden, ii. 616[1].
leidend, ii. 266[2].
Leidenschaft, ii. 267[1], ii. 268[2].
Leihen, ii. *640*[1].
leitendes Prinzip, ii. 1[1].
Leitungsaphasie, ii. *577*[1].
Lernfähigkeit, 11[1].
letzter Wille, ii. 817[2].
Liberalismus, ii. 4[1].
Licht, ii. 768[2].
Licht (natürliches), ii. 6[1].
Lichtempfindung, 146[2], ii. 6[1], 781[1], ii. *780*[2].
Liebe, ii. 31[1].
Limitation, *161*[1].
limitativ (Urtheil), ii. 6[2].
linderndes Mittel, 50[1].
Linie, 395[1].
Linien (subjektive), ii. 611[1].
Listing'sches Gesetz der Augenbewegungen, ii. 8[2].
lobenswerth, ii. 323[1]
Locomotion, ii. 20[2].
Logik, 318[2], 392[1], ii. 20[2].
Logik (Algebra der), ii. 640[2].
Logik (exacte), ii. 23[2].
Logik (materielle), ii. 44[2].
Logik (soziale), ii. 537[1].
Logik der Mathematik, ii. 47[1].
logisch, ii. 27[2].
logische Analyse, 42[2].
logische Beziehungslehre, ii. 447[2].
logische Figur, ii. 28[1].
logische Machina, ii. 28[2].
Logo-, ii. 30[1].
Logomachie, ii. 30[2].
Logos, ii. 30[2].
Lohnfondstheorie, ii. 810[1].
Lokalisation (corticale), ii. 15[2].
Lokalisation der Gehörsempfindungen, ii. 20[1].
lokalisirte Industrie, ii. 20[2].
Lokalzeichen, ii. 15[1].
Lossprechung, 4[1].
Lösung, ii. 554[2].
Lucidität, ii. 31[2].
Lüge, ii. 4[2].
Lust, ii. 304[2].
Lust (Schmerz und), ii. 253[1].
Lust und Unlust, 453[2], ii. 678[1].
Lust und Unlust (das Gefühl der), *591*[2].
lustbetont, 62[1].
Lustbringend, 453[2].
Lustempfindung (Schmerz- und), ii. 678[1].
Lustlehre, 453[2].
Lutherthum, ii. 33[1].
Luxus, ii. 33[2].
Lymphe, ii. 33[2].

Machina (logische), ii. 28[2].
Macht, ii. 318[2].
Mächtigkeit, ii. 117[1], ii. *117*[2].
Magie, ii. 35[1], 557[1].
Magnetismus, ii. 36[2].
Mahomedanismus (Islam), ii. 95[1].
Majestätsbeleidigung, ii. 3[1].

Makrokosmus, ii. 34[1].
malend, *440*[2].
malerisch, ii. 301[1], ii. *301*[2].
Malthus'sches Gesetz, ii. 38[2].
Manichäismus, ii. 40[2].
Manie, ii. 34[2], 39[2].
Mannbarkeit, ii. 396[1].
Mannigfaltiges, ii. 117[1].
Mannigfaltigkeit, ii. 116[2].
Mannigfaltigkeit (Einheit in der), ii. 736[2].
männlich, ii. 37[2].
marginal, ii. 42[1].
Markt, ii. 43[2].
Maroniten, 297[2].
Masse, ii. 44[1].
Massenmittelpunkt, 169[2].
massgebende (Bedingungen), ii. 113[1].
Massgesetz, *376*[2].
Mässigkeit, ii. 672[2].
Massmethoden (psychophysische), ii. 392[1].
Massstab, 21[2].
Materialismus, ii. 45[1].
Materie, ii. 49[1].
Materie (Stoff) **und Form**, ii. 50[1].
materielle Logik, ii. 44[2].
Mathematik, ii. 47[2].
Mathematik (Logik), ii. 47[1].
Mathematische Oekonomik, ii. 47[1].
Matriarchat, ii. 48[2].
Mattigkeit, 628[1].
Maxime, ii. 55[1].
Mechanik, ii. 59[1].
Mechanik der Vorstellungen, ii. *59*[2].
mechanisch, ii. 58[2].
mechanisches Aequivalent, ii. 59[1].
Mechanismus, ii. 59[2].
Medium, ii. 60[1].
medizinische Psychologie, ii. 60[1].
Megalomanie, 420[1], ii. 60[2].
mehrdeutig, 338[2].
mehrdeutige Zuordnung, *518*[2].
Mehrheit, ii. 306[2], 734[1].
Mehrheit der Ursachen, ii. 306[2].
Mehrwerth, ii. 625[2].
Meinen, 560[1], ii. 204[2], ii. *184*[2].
Meinung, ii. 57[1], 204[2], ii. *184*[2], ii. 204[2].
Melancholie, ii. 61[1].
Meliorismus, ii. 62[2].
Menge, ii. 117[2].
Mensch, ii. 39[1].
Menschen (Bestimmung des), 460[2].
Menschenaffen, 51[1].
menschenähnliche Affen, 51[1].
Menschenliebe, 174[1].
Menschheit, ii. 41[1].
Menschheitsreligion, ii. 462[1].
Menschwerdung, 528[2].
Mercantil-system, ii. 68[2].
Meridian, 276[2].
Merken, 284[1].
Merkmal, 191[2], ii. 43[1].
Mesenchyma, ii. 69[2].
Mesoderm, ii. 70[1].
Mesothel, ii. 70[2].
Messe, ii. 44[1].
Messias, ii. 70[2].
Messias (Hoffnung auf den), ii. 71[1].
Messung, ii. 57[1].
Metabolismus, ii. 71[1].
Metagenese, ii. 71[2].
Metamer, ii. 71[2].
Metamorphose, ii. 72[1].
Metamorphopsie, ii. 71[2].
Metaphysik, ii. 72[2]; *591*[1].
metaphysische Wahrheit (nothwendige), *595*[1].
Metawirthschaft, ii. 74[1].
Metazoon, ii. 74[1].
metempirisch, ii. 74[2]
Metempsychose, ii. 74[2].
Methode, 45[1], 306[2], 409[2], 420[1], ii. 75[1].
Methode (Sokratische), ii. 548[2].
Methode (wissenschaftliche), ii. 500[2].
Methode der Differenz, 280[2].
Methode der eben merklichen Unterschiede, 281[2].
Methode der Exclusion, 356[2].
Methode der inneren Wahrnehmung (*or* Selbstbeobachtung), 567[2].
Methode der kleinsten Quadrate, 340[1].
Methode der Uebereinstimmung, 27[2].
Methoden der Ethik, ii. 76[1].
Methodenlehre, ii. 75[1], ii. 75[2].
methodische Einheit, ii. 76[2].
metronymisch, ii. 76[2].
Meyer'scher Versuch, ii. 77[1].
Migräne, ii. 77[2].
mikrocephal, ii. 77[1].
Mikrokosmus, ii. 34[1].
Mikroorganismus, ii. 77[2].
Millennium, ii. 79[1].
Mimicry, ii. 79[2].
Mimik, ii. 79[1], 81[2].
Minderwertigkeit (psychopathische), ii. 262[1].
Mischung, ii. 87[2].
Misfallen, ii. 304[2].
Misologie, ii. 87[1].
Missbilligung, ii. 467[2].
Missethat, ii. 38[1].
Missfallen und Wohlgefallen, ii. 678[1].
Missgeburt, ii. 103[1].
Missklang, 284[1].
miteinbegriffen, 525[2].
Miterleben, ii. 653[1].
mitfühlen, ii. 640[1].
Mitleid, ii. 302[1], 652[1].
Mitose, ii. 87[1].
Mitte, ii. 56[1]; *464*[2].
Mitte (rechte), ii. 56[2].
Mittel, 50[1], ii. 57[1], 678[2].
Mittel-, ii. 70[1].
Mittelbegriff, ii. 77[2].
mittlere Kraft, ii. 470[1].
mittleres Keimblatt, ii. 70[1].
Mnemonik, ii. 89[1].
Modalismus, ii. 89[1].
Modalität, ii. 89[2].
Modell, ii. 93[2].
moderne Psychologie (die), ii. 391[1].
Modul, ii. 94[1].
Modus, ii. 93[1].
möglich, ii. 313[1], ii. *91*[1].
möglichen Erfahrung (Einheit der), *594*[2].
Möglichkeit, ii. 313[1]; *594*[2].
Moll, ii. 86[1].
Moment, ii. 98[1]; *365*[1].
Monade, ii. 98[1].
Mondsucht, ii. 32[2].
Monergismus, ii. 99[2].
Monismus, ii. 99[2].
Mono-, ii. 101[1].
Monoïdeismus, ii. 101[1].
Monomanie, ii. 101[2].
Monophysiten, ii. 102[1].
Monopol, ii. 102[1].
Monotheismus, ii. 102[1].
Monothelitismus, ii. 102[2].
Monstrum, 103[1].
Montanismus, ii. 103[1].
moralische Fähigkeit, ii. 104[1].
moralische Statistik, ii. 106[2].
moralische Theologie, ii. 110[2].
moralische Verdorbenheit, 286[1].
moralischer Irrsinn, ii. 104[1].
Moralität, 556[1].
Moralität (gesetzliche), ii. 111[1].
Morphologie, ii. 111[2].
mosaische Theorie (des Sehens), ii. 111[2].
Motiv, 307[1], ii. 113[1]; *21*[2].
motorisch, ii. 113[2].
motorische Aphasie, 58[1].
motorische Elemente (sensorische und), ii. 520[1].
Mücken (fliegende), ii. 118[2].
Müdigkeit, 628[1], *374*[2].
Müller'scher Kreis, ii. 116[2].
Münzplatte, ii. 302[2].
Musik, ii. 121[2].
Muskel, ii. 119[1].
Muskelempfindung, ii. 121[1].
Muskellesen, ii. 120[1].
Mutation, ii. 122[1].
Mutismus, ii. 123[2].
Mutterrecht, ii. 48[2], ii. 49[1].
Myelitis, ii. 124[1].
Mysterien, ii. 124[2].
Mysticismus, ii. 124[2].
Mystik, ii. 124[2].
Mythe, ii. 126[1].
Mythentheorie, ii. 126[2].
Mythologie, ii. 126[2].

nach Merkmalen, 110[2].
Nachäffung, ii. 79[1].
nachahmend, ii. 79[1].
Nachahmung, 519[1], ii. 79[1].
Nachahmung (plastische), ii. 302[2].
Nachbild, 23[2].
Nachbild nach kurzdauerndem Reize, ii. 433[1].

nachdenken, 192², ii. 60¹.
Nachempfindung, 24¹.
Nachfrage (Angebot und), ii. 623².
Nachfrage (gegenseitige), ii. 429².
Nachlässigkeit, ii. 149¹.
Nachtblindheit, ii. 177¹.
Nachtwandeln, ii. 178².
Nachtwandler, ii. 177².
Nahrungsdotter, 274².
naiv, ii. 127¹.
Name, ii. 127¹.
Narkose, ii. 128¹.
Narkotika, ii. 128¹.
Narr, 388¹.
Nationalität, ii. 128².
National-Oekonomik, 307¹.
Nationalvermögen, ii. 128².
Nativismus, ii. 129¹.
Nativität, ii. 132².
Natur, ii. 138².
Natur (sittliche), ii. 141².
Naturalismus, ii. 137².
Naturalobligation, ii. 111¹.
Naturaltausch, 101².
Naturalwirtschaft, 101².
Naturentwickelung (Theorie der Stetigkeit der), ii. 726².
Naturgeschichte, ii. 133².
Naturgesetz, ii. 133².
Naturismus, ii. 142².
natürlich, ii. 133¹.
natürliche Auslese, ii. 134¹.
natürliche Religion, ii. 134¹.
natürliche Theologie, ii. 137².
natürliche Züchtung, ii. 134¹.
natürlicher Realismus, ii. 134¹.
natürliches Licht, ii. 6¹.
Naturphilosophie, ii. 142¹, ii. 141¹, 142¹.
Naturrecht, ii. 133², ii. *594*², ii. 133².
Naturrechte, ii. 134¹.
Naturverehrung, ii. 142².
Naturwissenschaft, ii. 133², 499¹.
Naturzustand, ii. 599¹.
Nazariten, ii. 142².
Nebular-Hypothese, ii. 142².
Necessitarianismus, ii. 143².
Negation, ii. 149¹; *161*¹.
negative Einheit, *459*¹.
negative Empfindung, ii. 149¹.
negative Schwankung, ii. 149¹.
negativen Werth (Reaction vom), 56¹.
Negativität, ii. 149¹; *458*², *463*², *464*¹, 463¹, 464².
Negativität (reine), *459*¹.
Negativität (sich auf sich beziehende), *459*¹.
Neid, 578¹.
Neigung, 22², 64², 529¹, ii. 359².
Nemesis, ii. 149².
Neo-, ii. 149².
Neo-Kantianismus, ii. 149².
Neo-Kriticismus, ii. 149².
Nerven (specifische Energie der), ii. 567².
Nerven(vasomotorische), ii. 759².
Nervenbeschwerde, ii. 175².
Nervenentzündung, ii. 171¹.
Nervenfilz, ii. 175².
Nervenhügel, 324².
Nervenlehre, ii. 172¹.
Nervenleiden, ii. 175².
Nervennetz, ii. 306¹.
Nervensegmenten, ii. 175¹.
Nervensystem, ii. 153².
Nervosität, ii. 166².
Nestorianer, ii. 167².
Netto, ii. 167².
Netzhaut, 510¹, ii. 470².
Netzhauterregung (oscillirende), ii. 470².
Netzhautgrube, 394¹.
Neubildung, ii. 437².
Neuerungsvertrag, ii. 186¹.
Neuhegelismus, ii. 149².
Neuplatonismus, ii. 150¹.
neupythagoreische Lehre, ii. 150¹.
Neuralgie, ii. 168¹.
Neurasthenie, ii. 168².
Neuraxon, ii. 171¹.
Neurit, ii. 171¹.
Neuroblast, ii. 171².
Neurologie, ii. 172¹.
Neuron, ii. 171², 175¹.
Neuronen (eingeschaltene), ii. 414².
Neuropathie, ii. 175².
Neuropilem, ii. 175².
Neuroporus, ii. 175².
Neurose, ii. 175².
neutrale Farbe, *146*².
Neutralität, ii. 176¹.
Nexus, ii. 176².
nicht dispositionsfähig, ii. 181¹.
Nicht-Gebrauch (Gebrauch und), ii. 744².
Nicht-ich, ii. 181¹.
Nichts, ii. **183**²; 109², 462¹.
Nichts (Nicht-sein), ii. 180¹.
Nichtseiendes, ii. 180¹.
Nicht-sein (Nichts), ii. 180¹.
nichtsterblich, ii. 7¹.
nicht-strebend, ii. 181².
Nichtwissen, ii. 167².
Niedergeschlagenheit, 123².
Niessbrauch, ii. 744².
Nihilismus, ii. 177².
Nirvâna, ii. 178¹.
noëtisch, ii. 178².
nominal, ii. 179².
Nominalismus, ii. 180¹.
Nomologie, ii. 180¹.
Noologie, ii. 181².
Norm, ii. 182¹, 481².
normal, ii. 182², 183¹.
normale Werthe, ii. *825*¹.
Normalität, ii. 182¹.
Normalreiz, ii. 183¹.
normativ (normgebend), ii. 182¹.
normgebend, *see* normativ.
Note, ii. 183².
Notenblindheit, ii. 183².
Noth, ii. *143*².
nothwendig, ii. 143², ii. *91*¹.
nothwendige Bedingung, ii. 143¹.
nothwendige metaphysische Wahrheit, *595*¹.
Nothwendigkeit, ii. 143²; *161*¹.
Nothwendigkeitsgläubiger, ii. 143².
noumenal, ii. 184².
Noumenon, ii. 184²; *596*¹, ii. 7¹; 594², 595².
Novation, ii. 186¹.
Nuance, 197¹.
Nullibristen, ii. 186².
Nullpunkt, 533¹.
Nullversuch, ii. 404¹, ii. 404².
Nus, ii. 185².
Nutzen, ii. 744¹.
Nützlichkeit, 360¹, ii. 745².

Ober-(Begriff, &c.), ii. 37¹.
oberes Erkenntnissvermögen, *591*².
Oberfläche, ii. 625².
Oberhoheit über das Staatsgut, 316¹.
Oberton, 441², ii. 252².
Objekt, ii. 191¹, 192¹.
objektif, ii. 191¹.
Objektiv, ii. 192².
objektiver Begriff (subjektiver und), 463².
objektives Recht, ii. 193², ii. *474*².
Objectivismus, ii. 194¹.
Objektivität, *462*², 457², 461², 463², 464².
Obligation, ii. 194¹.
Obscurantismus, ii. 198¹.
Occamismus, ii. 199¹.
Occasionalismus, ii. 199¹.
Oekologie, ii. 200¹.
Oekonomie, 307¹.
Oekonomie (statische), ii. 600¹.
Oekonomieprincip, 309¹.
Oekonomik, 301².
Oekonomik (mathematische), ii. 47¹.
Offenbarung, ii. 41¹, 471².
öffentlich, ii. 396¹.
Ohnmacht, 369¹, ii. 628¹.
Ohr, 443¹.
Ohrenkunde, ii. 251².
ökonomische Methode, 306².
ökonomisches Gesetz, 306¹.
ökonomisches Motiv, 307¹.
Oneirologie, ii. 201².
Ontogenesis, ii. 202¹.
ontogenetische Entwicklung, ii. 202¹.
Ontologie, ii. 203².
ontologisches Argument, ii. 202².
Ontologismus, ii. 203¹.
Opfer, ii. 484¹.
Ophelimität, ii. 204².
Ophthalmie, ii. 204².
Opposition, ii. 205².
Opposition (soziale), ii. 537².
Optik, ii. 210¹.
Optimismus, ii. 210².

optische Täuschungen, ii. 206[1].
Orakel, ii. 212[1].
Ordnung, ii. 212[1].
Ordnung (sittliche), ii. 212[1].
Organ, 40[2], 313[1], 484[1], ii. 212[2].
Organe, 40[2].
Organempfindung, ii. 218[1].
Organisation, ii. 219[1].
Organisation (soziale), ii. 537[2].
organisch, ii. 5[1], 213[1].
organische Selektion, ii. 213[2].
organisches Gedächtniss, ii. 213[2].
Organismen (einzellige), ii. 726[1].
Organismus, ii. 218[1].
Organismus (sozialer), ii. 537[2].
Orientirung, ii. 242[1].
Orientirung (Gesetz der constanten), ii. 242[2].
Orientirungstäuschung, ii. 242[2].
originell, ii. 250[1].
orphische Dichtungen, ii. 250[1].
Orthodoxie, ii. 250[2].
Orthogenesis, ii. 250[2].
Orthoplasie, ii. 251[1].
oscillirende Netzhauterregung, ii. 470[2].
Oxy-, ii. 252[2].

Pädagogik, ii. 275[1].
pädagogische Psychologie, ii. 274[2].
Paganismus, ii. 253[1].
Palaeontologie, ii. 254[2].
Palingenese, ii. 254[2].
Panentheismus, ii. 255[1].
Pangenesis, ii. 255[1].
Panlogismus, ii. 255[2].
Panmixie, ii. 255[2].
Panpneumatismus, ii. 256[1].
Panpsychismus, ii. 256[1].
Pantheismus, ii. 256[2].
Panthelismus, ii. 257[2].
Papst, ii. 309[2].
para-, ii. 258[1].
paradox, ii. 258[1].
Parallelismus, 295[1].
Parallelismus (psychophysischer), ii. 258[1].
Parallelogramm der Kräfte, ii. 259[1].
Paralogismus, ii. 259[1].
Paralyse, ii. 259[1].
Paranoia, ii. **261**[1].
Parasit, ii. 262[2].
Parasiten, 328[2].
Parese, ii. 263[1].
Paroxysmus, ii. 263[2].
Partei, ii. 266[2].
Parthenogenese, ii. 264[1].
Partialtöne, ii. 265[2].
partiell, ii. 265[2].
Parusie, ii. 263[2].
passend, ii. 359[2].
Passendsten (Ueberleben der), 385[2].
Passion, *12*[1].
passiv, ii. 266[2].
Passivität, ii. 266[2].
Pastoraltheologie, 60[2].
Patellarreflex, 602[1].
pathetisch, ii. 268[1], ii. 268[1].
Pathologie (des Geistes), ii. 267[2].
pathologische Psychologie, 2[2].
Pathos, ii. 268[1], ii. 268[1].
Patriarchat, ii. 268[2].
Patristik, ii. 274[1].
patristische Philosophie, ii. 268[2].
patronymisch, ii. 274[2].
Pelagianismus, ii. 275[2].
Pelagianismus (Semi-), ii. 514[2].
Pentateuch, ii. 276[1].
Perception, ii. **680**[2].
Perfektibilität, ii. 278[2].
Perfektibilitätslehre, ii. 278[2].
Perfektionismus, ii. 278[2].
Periodicität, ii. 279[2].
periodisches (Irresein), ii. 279[2].
Peripatetiker, ii. 280[1].
periphere Ganglienzelle, 405[1].
Permanenz, ii. 280[2].
Perseität, ii. 281[1].
Person, ii. 282[2].
Personalität, ii. 282[2].
Personalselektion, 538[2].
Personification, ii. 286[1].
persönlich, ii. 283[1].
persönliche Einheit, 492[1].
persönliche Gleichung, ii. 283[1].
persönliche Identität, ii. 283[2].
Persönlichkeit, ii. 282[2].
Persönlichkeitsstörungen, ii. 284[2].
Perspicuität, ii. 286[2].
Perversion, ii. 287[1].
Pessimismus, ii. 210[2].
Pflanze, ii. 302[2].
Pflanzenthiere, 192[1].
Pflicht, 301[1].
Phänomen, 327[2], ii. 289[1].
Phänomen (Purkinje'sches), ii. 403[2].
Phänomenalismus, ii. 288[2].
Phänomenologie, ii. 288[2].
Phantasie, 374[1], 517[1].
Phantasma, ii. 288[1].
phantastisch, 374[2].
Pharisäertum, ii. 288[1].
Phase, ii. 288[2].
Philanthropie, ii. 289[2].
Philologie, ii. 289[2].
Philosoph auf dem Throne, ii. 290[1].
Philosophem, ii. 290[1].
Philosophenschulen der Griechen, ii. 495[2].
Philosophie, 520[2], ii. 290[2].
Philosophie (die synthetische), ii. 659[1].
Philosophie (patristische), ii. 268[2].
Philosophie (scholastische), ii. 491[2].
Philosophie (die Schopenhauer'sche), ii. 499[1].
Philosophie (Sokratische), ii. 549[1].
Philosophie (soziale), ii. 538[2].
Philosophie (vorsokratische), ii. 334[1].
Philosophie der Geschichte, ii. 595[1].
Philosophie des Unbewussten, ii. 724[2].
-phobie, ii. 296[1].
Phonetik, ii. 296[2].
Phoronomie, ii. 297[2].
Photometrie, ii. 297[2].
Phrenologie, ii. 298[2].
Phylogenie, ii. 299[2].
Phylum, ii. **299**[2].
Physik, ii. 299[2].
Physiognomie, ii. 300[1].
Physiognomik, ii. 300[1].
Physiokraten, ii. 300[1].
Physiologie, ii. 300[2].
physiologische Auslese, ii. 300[2].
physiologische Psychologie, ii. 390[1].
physiologische Selektion, ii. 300[2].
physiologische Zerstreuungskreise, ii. 300[2].
Pietismus, ii. 301[2].
pittoresk, ii. 301[1].
Plagalschluss, 149[2].
Plan, ii. 678[2], ii. 404[1].
Plasma, ii. 302[2].
Plasticität, ii. 302[2].
plastische Nachahmung, ii. 302[2].
Platzangst, 27[1].
Platzfurcht, 27[1].
Pleroma, ii. 305[2].
Plexus, ii. 305[2].
Pluralismus, ii. 306[1].
Pneumatologie, ii. 308[1].
Pöbel, ii. 89[1].
Polemik, ii. 308[2].
Politik, ii. 309[1].
poly-, ii. 309[1].
Porphyrius (Baum des), ii. 714[1].
Position, ii. 310[2], ii. 311[1].
positiv, ii. 311[2].
positive Theologie, ii. 312[2].
positives Recht, ii. 312[1].
Positivismus, ii. 312[2].
Postprädicament, ii. 315[2].
Postulat, ii. 315[2], 338[1].
Potential, ii. 316[2].
Potentialfunktion, ii. 316[2].
Potentialität, ii. 317[1].
potentiell, ii. 316[2].
Potenz, ii. 317[2], 318[2].
potenzierender Stil und Thatsachenstil, ii. 424[1].
präcis, ii. 323[1].
Präcision, ii. 323[2].
Prädestination, ii. 325[1].
Prädetermination, ii. 325[1].
Prädicabilien, ii. 325[1].
Prädikation, ii. 326[1].
Prädisposition, ii. 329[2].
Praedicament, ii. 325[2].
Präexistenz, ii. 330[1].
Präformation, ii. 330[1].
Präformist, 48[1].
pragmatisch, ii. 321[2].
Pragmatismus, ii. 321[2].

prähistorisch, 65[2].
praktisch, ii. 320[1].
praktische Religion, ii. 321[1].
praktische Theologie, ii. 321[1].
praktische Vernunft, ii. 320[2].
praktisches Urtheil, ii. 320[1].
Prämie, 125[1].
Prämisse, ii. 330[2].
Präperception, ii. 331[2].
Präpotenz, ii. 331[2].
Präsens, ii. 333[1].
Präsenszeit, ii. 333[1].
Präsentationismus, ii. 333[2].
prästabilirte Harmonie, ii. 329[2].
präsumiren, ii. 337[2].
Praxis, ii. 321[1].
Prehension, ii. 330[2].
Preis, ii. 338[2].
preiswürdig, ii. 323[1].
Presbyopie, ii. 332[1].
Priester, ii. 340[1].
Priesterwesen, ii. 483[2].
Primärstellung, ii. 340[2].
Primat, ii. *340*[1].
Primaten, ii. 340[2].
primitiv, ii. 340[1].
Primitivband, 98[1].
Primordium, ii. 481[1].
Princip, ii. 341[2].
Princip (leitendes), ii. 1[1].
Princip der constanten Orientirung, ii. 242[2].
Princip des kleinen Kraftmasses, *309*[1].
Principal, 321[2].
Principal- (in compounds, as Principalcoordination), ii. 341[2].
Principien des Schliessens (die), *643*[1].
priori (a), 594[2], 595[2].
Priorität, ii. 342[2].
privat, ii. 343[1].
Privatrecht, ii. 343[2].
Privilegium, ii. 343[2].
Probabilismus, ii. 344[1].
Probe, ii. 359[1], 682[1].
Problem, ii. 355.
problematisch, ii. 355[2].
Prodrome, ii. 357[1].
Produciren, ii. 357[1].
Produktion, 368[2], ii. 357[1].
produktiv, 594[1].
Produktivität, 281[2], 311[1], 529[2].
Prognathie, ii. 357[2].
progressiv, ii. 358[1].
Projekt, ii. 358[2], 678[2].
Projektion, 304[2], ii. 358[2].
Proliferation, ii. 359[1].
Prophezeiung, ii. 329[1], 361[1].
Proportion, ii. 361[1].
Prosodie, ii. 370[2].
Prostration, ii. 370[2].
Prosyllogismus, ii. 370[2].
Protanopie, ii. 370[2].
Protestantismus, ii. 372[2].
Protist, ii. 372[2].
Proton, ii. 481[1], 678[2].
Protoplasma, ii. 372[2].
Protozoon, ii. 373[1].
Prozess, 12[1], ii. 356[1].
Prozess (sozialer), ii. 538[2].
Prozessrecht, 156[1].
Prüfung, ii. 355[2], 682[1].
Pseudästhesie, ii. 374[2].
pseudo-, ii. 374[2].
Psyche, ii. 374[2].
Psychiatrie, 33[1], ii. 375[2].
psychisch und psychologisch, ii. 376[1].
Psychische (das), ii. 680[2].
psychische Activität, 13[2].
psychische Analyse, 43[1], 43[2].
psychische Beschaffenheit, ii. 68[2].
psychische Funktion, 397[2].
psychische Funktion der Sprache, 626[1].
psychische Hemmung, 546[2].
psychische Qualität, ii. 409[1].
psychische Stummheit, 300[1].
psychische Synthese, ii. 658[2].
psychische Wirkungen der Arzneimittel, ii. 376[1].
psychischen Atomen (Theorie der), ii. 85[2].
psychischen Stoffes (Theorie des), ii. 86[1].
psychischer Automatismus, 95[1].
psychisches Wachsen (Wachsthum), 433[1].
Psycho-, ii. 382[1].
Psychogenesis, ii. 382[1].
psychogenetisch, ii. 382[2].
Psychologenfehler, ii. 382[2].
Psychologie, 2[2], 116[1], 410[1], 605[1], ii. 382[2].
Psychologie der Geistesstörungen, 2[2].
Psychologie des Kindes, 175[1].
Psychologie (die moderne), ii. 391[1].
Psychologie (empirische), ii. 389[1].
Psychologie (experimentelle), ii. 389[1].
Psychologie (medizinische), ii. 60[1].
Psychologie (pädagogische), ii. 274[2].
Psychologie (physiologische), ii. 390[1].
Psychologie (rationale), ii. 389[1].
Psychologie (soziale), ii. 538[2].
psychologisch (psychisch und), ii. 376[1].
psychologisches Institut, 605[1].
Psychologismus, ii. 382[2].
Psychometrie, ii. 391[1], ii. 391[2].
psychomotorisch, ii. 391[2].
Psychonomik, ii. 391[2].
psychopathische Minderwertigkeit, ii. 262[1].
Psychopathologie, ii. 267[2], 391[2].
Psychophysik, ii. 392[2].
psychophysische Massmethoden, ii. 392[1].
psychophysischer Parallelismus, 295[1], ii. 258[1].
Psychose, ii. 392[2].
Psychotherapie, ii. 82[1], 394[2].
Ptolemäisches Weltsystem, ii. 396[1].
Pubertät, ii. 396[1].
Publicum, ii. 396[1].
Puls, ii. 397[1].
Pulsschläge, ii. 397[1].
Punkt, 504[1].
Punkt (Punktdistanz), ii. 308[1].
Punktdistanz, ii. 308[1].
Puppe, 182[1], ii. 401[2].
Puritaner (Lehre der), ii. 402[1].
Purkinje-Nachbild, ii. 433[1].
Purkinje'sche Bilder, ii. 403[2].
Purkinje'sches Phänomen, ii. 403[2].
Pyrrhonismus, ii. 404[2].

Quadrat, 340[1].
Qualität, 191[2], ii. 406[1], 463[2].
Qualität (psychische), ii. 409[1].
Quantität, ii. 409[2].
Quiddität, ii. 412[2].
Quietismus, ii. 412[2].

Rabbinismus, ii. 413[1].
Rache, ii. 471[2], 760[2].
Rang, 419[2].
Rapport, ii. 415[1].
Raserei, 396[2].
Rasse, ii. 413[2].
Rassenanlage, ii. 603[2].
Rassenpsychologie, ii. 414[1].
Rast, ii. 469[2].
rational, ii. 415[1].
rationale Psychologie, ii. 389[1].
Rationalismus, ii. 415[2].
Rauhempfindung, ii. 480[2].
Rauhigkeit, 442[2], ii. 480[1].
Raum, ii. 559[1]; *365*[1].
raumähnliches Moment, *365*[1].
Raumerfüllung (continuirliche), ii. 305[2].
räumliches Moment, *365*[1].
Raumlokalisation, ii. 566[1].
Raumwahrnehmung, ii. 566[1].
Reagens, ii. 420[1].
Reaktion, 12[2], 56[1], ii. 417[1].
Reaktionsprincip, 12[2].
Reaktionszeit, ii. 417[1].
real, ii. 420[1].
Realen, ii. 424[2].
Realen (Selbsterhaltung der), ii. 511[2].
Real-Idealismus, ii. 421[2].
Realismus, ii. 421[2].
Realismus (natürlicher), ii. 134[1].
Realität, ii. 420[2]; *161*[1], *462*[1], 461[2].
Realitätsgefühl, ii. 424[2].
Real-Urteil, *44*[2].
Receptivität, ii. 429[2], ii. *429*[2].
Rechentisch, 1[1].
Rechnung, 150[1].
Recht, 76[2], 153[1], 184[1], 290[1], ii. 474[1]; *16*[2].
Recht (objektives), ii. 193[2], ii. *474*[2].
Recht (positives), ii. 312[1].
Recht (römisches), ii. 478[1].
Recht (subjektives), ii. *474*[2].

Recht- (und Link-)händigkeit, 277[1].
Recht (ungeschriebenes), ii. 743[2].
rechte Mitte, ii. 56[2].
Rechtfertigung, 587[1].
rechtlich, 584[2].
Rechtlichkeit, ii. 433[1], 474[2].
Rechtschaffenheit, ii. 744[1].
Rechtsfall, 163[1].
Rechtsfiction, ii. 2[1].
Rechtsgang, ii. 356[1].
Rechtsgelehrter, 585[1].
Rechtsgeschäft, 11[2].
Rechtshandel, 12[1].
Rechtshändigkeit, ii. 475[1].
Rechtslehre, ii. 594[1], ii. *594*[2].
Rechtsphilosophie, ii. 594[1], ii. *474*[1].
Rechtsprechung, 584[2].
Rechtsregel, ii. 55[2].
Rechtsverhandlung, ii. 356[1].
Rechtsverletzung, ii. 706[1].
Rechtswissenschaft, 201[2].
Rechtszweck des Staats, 305[2].
recidivirend, ii. 433[1].
Redekunst, ii. 473[1].
redend, *186*[1].
Reduktionstheilung, ii. 435[2].
Reflection, 456[1].
Reflex (bewusster), ii. 436[1].
Reflexbewegung, ii. 436[2].
Reflexion, ii. 435[2].
reflexiv, ii. 436[1].
Reflexthätigkeit, *12*[1].
Reformation, ii. 437[2].
Refraktion, ii. 437[2].
Refraktionsstörung, 36[2].
Regel, 416[1], ii. 481.
regelmässig, ii. 438[2].
Regeln, 594[2].
regelrecht, ii. 183[1].
Regeneration, ii. 437[2].
Regierung, 418[2].
regulär, ii. 439[1].
Reich (Lehre von dem tausendjährigen), ii. 79[1].
rein, ii. 401[2], ii. *401*[2].
reine Erfahrung, ii. 402[2].
reine oder sich auf sich beziehende Negativität, *459*[1].
reine Unmittelbarkeit, 459[2].
reine Vernunfterkenntniss aus Begriffen, *591*[1].
reiner Vernunft (aus), 591[1], 594[2].
reines Denken, 56[1].
reines Sein, *462*[1].
Reinheit, ii. 403[1].
Reiz, 575[2], 603[2].
Reizbarkeit, 356[1], 575[2], ii. 519[1].
Reize (Nachbild nach kurzdauerndem), ii. 433[1].
Reizhöhe, ii. 7[2].
reizleitend, 19[2].
Reizmittel, 575[2], ii. 603[1].
Reiz-Schwelle, ii. 696[2].
Reizumfang, ii. 414[2].
Reizung, ii. 603[2].
Reizwert, 155[1].
Relationsfärbung, 397[1].
relativ, ii. 443[2].
Relativismus, ii. 450[2].
Relativität, ii. 450[1].
Relativität (Gesetz der), ii. 450[2].
Relativität der Erkenntniss, ii. 450[2].
Religion, ii. 452[1].
Religion (natürliche), ii. 134[1].
Religion (praktische), ii. 321[1].
Religion der Vedas, ii. 760[1].
Religionsfreiheit, ii. 4[1].
Religionsinstinkt, ii. 462[2].
Religionspartei, ii. 504[1].
Religionsphilosophie, ii. 454[1].
Religionsverachtung, 575[2].
Religionswissenschaft, 201[2].
religiöses Bewusstsein, ii. 462[2].
Remonstranten, ii. 463[1].
Renaissance, ii. 463[2].
Rente, ii. 463[2].
Repräsentation, ii. 464[2], ii. 464[2].
Repräsentationismus, ii. 464[2].
repräsentiren, ii. 464[2].
reproducirte Vorstellung, ii. 464[2].
Reproduktion, ii. 465[2].
Reproduktion (willkürliche), ii. 432[2].
Reproduktionstreue, 381[2].
Repugnanz, ii. 465[1].
Respekt, ii. 468[2].
Rest, ii. 707[2].
Restmethode, ii. 467[2].
Resultante, ii. 470[1].
Resultat, ii. 470[1].
resultirender Ton, ii. 470[1].
Reue, ii. 276[1], 464[1].
Reverie, ii. 472[1].
Reversion, ii. 472[1].
Rhetorik, ii. 473[1].
Rhythmus, ii. 473[1].
Richtung, 283[2].
Richtungslinie (-strahl), ii. 8[1].
Richtungsstrahl, ii. 417[1].
Rigorismus, ii. 475[1].
Rigoristen, ii. 475[1].
Ritschl (Lehre von), ii. 475[2].
Ritual, ii. 476[1].
romantisch, ii. 479[1].
Römisches Recht, 184[1], ii. 478[1].
Rothblindheit, *279*[2].
Rückenmark, ii. 581[1].
Rückenmarksentzündung, ii. 124[1].
Rückensaite, ii. 184[2].
Rückkehr, ii. 438[1].
Rückschlag, ii. 472[1].
Rückschritt (sozialer), ii. 538[2].
Rudiment, ii. 481[1], 678[2].
Ruhe, ii. 464[1], 469[2].
Ruhe (Bewegung und), ii. 112[2].
rührend, *186*[2], ii. *268*[1].

Sabbaths-Beobachter (Lehre der strengen), ii. 483[1].
Sabellianismus, ii. 483[1].
Sache, ii. 695[1], ii. 91[2].
Sacrament, ii. 483[2].
Sadducäer (Lehre der), ii. 484[1].
Sagen-Wollen, 560[1].
Samen, ii. 580[2].
Samenbildung, ii. 580[2].
Sammel-, 193[2].
sanguinisch, ii. 487[1].
Sanktion, ii. 485[2].
Sanson'sche Bilder, ii. 403[2].
Satan, ii. 487[2].
Sättigung, ii. 488[1].
Satz, ii. 361[2].
Satz vom zureichenden Grund, ii. 616[1].
Sätze, *44*[2].
Sätze (allgemeine), ii. *739*[1].
Sätze (gemeine), ii. *739*[1].
Sätze (generale), ii. *739*[1].
Sätze (universale), ii. *739*[1].
Satzungsrecht, ii. 312[1].
Säugethier, ii. 38[2].
Säule, 197[2].
Schädelbohrer (kleiner), ii. 714[2].
Schädelkapazität, 153[2].
Schadenfreude, 198[2].
Schall, 449[2].
Scham, ii. 525[2].
Schamanismus, ii. 525[2].
Schamhaftigkeit, ii. 526[2].
Schauen, ii. 568[2].
Schein, ii. 513[1]; *108*[1], ii. *38*[1]; 596[1], ii. 289[1], 565[1], 703[1].
Schein (bewusster), ii. 37[1].
Schein und Erscheinung, ii. *514*[1].
scheinbare verticale Meridiane der Sehfelder, 276[2].
Scheiner'scher Versuch, ii. 490[1].
Scheingefecht, ii. 564[2].
Scheinthätigkeit, ii. 513[1].
Scheitel, ii. 762[1].
Schema, ii. 490[2].
Schemata, *594*[1], ii. *91*[1].
Schematismus, ii. 490[2].
Schenkel, ii. 275[1].
Schenkung, 294[2].
Schiedspruch, 97[2].
schiedsrichterliche Beurteilung und Entscheidung, 65[1].
Schielen, ii. 604[1].
Schisma, ii. 491[2].
Schlaf, ii. 533[1].
schlafbringend, 490[1].
Schlaffheit, 627[2].
Schlaflosigkeit, 554[2], ii. 534[1].
Schlafwandeln, ii. 555[2].
Schlafwandler, ii. 177[2].
Schlag, 60[1].
Schlagader, 73[2].
Schlaganfall, ii. 604[2].
Schleifen, 181[2].
Schliessen, 542[2], ii. 426[1].
Schluckreflex, ii. 626[1].
Schluss, 149[2], 542[2], ii. 628[2]; *456*[1], *464*[2].
Schluss-Fehler, 372[1].
Schlussfigur, 382[2].
Schlusskette, 171[1].
Schlussmodus, ii. 103[2].
Schmerz, 293[1], ii. 254[1].
Schmerz und Lust, ii. 253[1].

Schmerz- und Lustempfindung, ii. 678[1].
Schmerzempfindlichkeit, 33[1].
Schmerzlosigkeit, 40[2].
Schmerzpunkte, ii. 254[2].
schmerzstillendes Mittel, 50[1].
Schnelligkeit, ii. 760[2].
Schnitt, 416[1].
Schock, ii. 526[1].
Scholastik, ii. 491[2].
Scholastiker, ii. 495[2].
scholastische Philosophie, ii. 491[2].
Schöne (das), 104[1].
Schönheit, 104[1].
Schönheitslinie, ii. 8[1].
Schopenhauer'sche Philosophie, ii. 499[1].
schöpferisch, *594*[1].
schöpferische Begriff (der), 425[2].
Schöpfung, 342[1], ii. 357[1].
Schreiben, 94[2].
Schreibkrampf, ii. 826[2].
Schrift (heilige), ii. 503[2].
Schriften (heilige), ii. 484[1].
Schüchternheit, 102[2].
Schuld, 375[2], 434[1].
Schuldverpflichtung, ii. 194[1].
Schule, 30[2].
Schutz, ii. 371[1].
Schutz- (färbung, &c.), ii. 371[2].
Schutzfarben, ii. 811[2].
Schutzzoll, ii. 371[1].
Schwächegefühl, 369[1].
Schwachsichtigkeit, 36[2].
Schwachsinn, 519[1].
Schwachsinnigkeit, 377[1].
Schwangerschaft, 413[1].
Schwankung (negative), ii. 149[1].
Schwankungen der Aufmerksamkeit, 387[1].
Schwarz-weiss-Reihe, *146*[2].
Schwebungen, 103[2].
Schwere (Empfindung der), ii. 812[2].
Schwere (specifische), ii. 567[2].
Schwerkraft, 421[1].
Schwerpunkt, 169[2].
Schwindel, ii. 762[1].
Schwindelgefühl, 291[1].
Scotismus, ii. 503[2].
Seele, ii. **680**[2], ii. 82[1], 557[2]; 592[2], ii. 680[1], 681[2].
Seele der Welt (die), *458*[2].
Seelenblindheit, 123[1], ii. 192[1].
Seelenerrettung, ii. 680[2].
Seelenleben, ii. 680[2].
Seelensitz, ii. 680[2].
Seelensubstanz, ii. 680[2].
Seelensubstanz (Theorie der), ii. 557[2].
Seelenvermögen, 369[1], ii. 680[2].
Seelenwanderung, ii. 74[2], ii. 680[2].
Seelenzellen (Theorie der), ii. 86[1].
seelische Entwickelung, ii. 67[1].
seelische Erregungen, ii. *724*[2].
Segmentation, ii. 504[2].
Sehen, 117[2], 533[2], ii. 765[1].
Sehen (stereoskopisches), ii. 602[1].
Sehens (mosaische Theorie des), ii. 111[2].
Sehfeld, 276[2], 382[1].
Sehfelder (Wettstreit der), ii. 470[2].
Sehnenempfindung, ii. 674[2].
Sehproben, ii. 686[1].
Sein, 109[2], *342*[1], *461*[2], 455[1], 456, 461[2], 462[1], 463, 464[1], ii. 91[2].
Sein (reines), *462*[1].
Seitenwendungswinkel (des Blickes), 47[1].
seitlicher Fensterversuch, ii. 527[1].
Sekte, ii. 504[1].
Selbst, ii. 507[2].
Selbst (an ihm), 459[1].
Selbst (das), 312[1].
Selbstbeherrschung, ii. 509[1].
Selbstbeobachtung, 567[2], ii. 198[1].
Selbstbestimmung, ii. 509[1].
Selbstbewusstein, ii. 509[1].
Selbstbezwingung, ii. 469[2].
Selbstdarstellung, ii. 510[1], ii. 679[2].
Selbsterhaltung der Realen, ii. 511[2].
Selbsterhaltungstrieb, ii. 511[2].
Selbsterkenntniss, ii. 510[2].
Selbstgefühl, ii. 508[2].
Selbstgerechtigkeit, ii. 512[2].
Selbstherrschaft, 93[1].
Selbstkosten, 360[2].
Selbstliebe, ii. 510[2].
Selbstmord, ii. 620[1].
Selbstsucht, ii. 510[1].
Selbsttäuschung (bewusste), ii. *513*[2].
Selbstthätigkeit, ii. 508[2].
Selbstvergessenheit, ii. 509[2].
Selbstverleugnung, ii. 509[1].
selbstverständlich, ii. *681*[1].
selbstverständliche Voraussetzung, 596[1].
Selbstverwirklichung, ii. 512[2].
Selbstzweck, ii. **680**[2]; *96*[1].
Selektion, 74[1], ii. 564[2].
Selektion (genetische), ii. 465[2].
Selektion (indirekte), ii. 213[2].
Selektion (organische), ii. 213[2].
Selektion (physiologische), ii. 300[2].
Selektion (sexuelle), ii. 525[1].
Semantik, ii. 513[1].
Semi-Pelagianismus, ii. 514[2].
Senescenz, ii. 514[2].
sensibel, ii. **680**[2].
Sensibilität, ii. **680**[2].
sensorimotorisch, ii. 519[2].
sensorisch, ii. 519[2].
sensorische Aphasie, 58[1].
sensorische und motorische Elemente, ii. 520[1].
Sensorium, ii. 519[2].
Sensualismus, ii. 515[2], 520[1].
Septuaginta, ii. 521[2].
Serie, ii. 521[2].
Setzen, ii. 310[2], ii. 311[1].
Setzung, ii. 311[1].
Sexualempfindung, ii. 525[2].
sexuelle Auslese, ii. 525[1].
sexuelle Selektion, ii. 525[1].
Shi'iten (Sunniten und), ii. 621[1].
Sibyllinischen Bücher (die), ii. 527[1].
sich (an), *459*[2], *595*[2], 459[1], 461[2].
sich (an und für), *461*[1], 459[1].
sich (Ding an), *594*[2], *595*[2], *596*.
sich anpassend, 15[2].
sich auf sich beziehende Negativität, *459*[1].
Sich-Bestimmung, *464*[1].
sich erinnern an, ii. 463[1].
sich (für), *461*[1], 459[1].
Sieben Weisen (die), ii. 818[2].
Simulation, ii. 532[1].
Singen, 564[1].
Singularismus, ii. 533[1].
Sinken, ii. 59[2].
Sinn, ii. **681**[1], ii. 57[1], 515[2], ii. *678*[1].
Sinn (geistiger), ii. 517[1].
Sinn (innerer), *592*[2].
(Sinnes-)Anschauung, ii. *681*[1].
Sinnesenergie (specifische), ii. 567[2].
Sinnesorgane, ii. 517[2].
Sinnestäuschung, ii. 517[2].
sinnlich, ii. **681**[1]; 86[1], ii. 520[2].
sinnliches Begehren, 62[1].
Sinnlichkeit, ii. **681**[1]; 591[2], 594[1].
sinnlos, 6[2].
Sippe, 184[2].
Sittengesetz, 641[1].
Sittenlehre, 346[1].
sittliche Intuition, 568[2].
sittliche Natur, ii. 141[2].
sittliche Ordnung, ii. 212[1].
sittliche Verpflichtung, ii. 194[1].
sittlicher Fortschritt, ii. 105[2].
sittliches Gefühl, ii. 106[1].
sittliches Urtheil, ii. 105[1].
Sittlichkeit, ii. 111[1].
Skepticismus, ii. 489[1].
Sklaverei, ii. 522[1].
Sklerose, ii. 503[1].
Skrupel, ii. 503[2].
Socinianer, ii. 544[1].
Sokratische Methode, ii. 548[2].
Sokratische Philosophie, ii. 549[1].
Solidarität, ii. 553[1].
Solipsismus, ii. 553[1].
sollen, 502[1].
Sollen (das), ii. 251[2].
Soma, ii. 554[2].
Somatologie, ii. 555[1].
Somatopleura, ii. 555[1].
Somnambulismus, ii. 555[2].
Sophisma, ii. 556[1].
Sophisten, ii. 556[2].
Sophistik, ii. 556[2].
Souveränität, ii. 558[1].
sozial, 185[1].

soziale Auswahl und Unterdrückung, ii. 540[1].
soziale Dynamik, ii. 534[2].
soziale Einheit, ii. 541[1].
soziale Entwicklung und sozialer Fortschritt, ii. 535[2].
soziale Ethik, ii. 535[1].
soziale Kraft, ii. 537[1].
soziale Logik, ii. 537[1].
soziale Opposition, ii. 537[2].
soziale Organisation, ii. 537[2].
soziale Philosophie, ii. 538[2].
soziale Psychologie, ii. 538[2].
soziale Statik, ii. 540[1].
soziale Wissenschaften, ii. 539[2].
sozialer Contract, ii. 534[2].
sozialer Fortschritt, ii. 535[2].
sozialer Organismus, ii. 537[2].
sozialer Prozess, ii. 538[2].
sozialer Rückschritt, ii. 538[2].
sozialer Streit, ii. 537[2].
sozialer Verfall, ii. 538[2].
sozialer Wille, 407[1], 201[1].
soziales Bewusstsein, ii. 534[1].
soziales Gewebe, ii. 541[1].
Sozialisierung, ii. 543[1].
Sozialismus, ii. 541[2].
Soziologie, ii. 544[1].
Sozionomik, ii. 548[2].
Sozius, ii. 548[2].
Spannungsempfindung, 311[2], ii. 604[1].
Spannungsirrsinn, 598[2].
Sparsamkeit, ii. 264[1].
Spasmus, ii. 566[2].
spastischer Krampf, ii. 566[2].
Specification, ii. 567[2].
specifische Energie der Nerven, ii. 567[2].
specifische Schwere, ii. 567[2].
specifische Sinnesenergie, ii. 567[2].
specifisches Gewicht, ii. 567[2].
Spectrum, ii. 568[1].
Spekulation, ii. 568[2].
Spermzelle, ii. 580[2].
Spiegelschrift, ii. 86[2].
Spiel, ii. 303[2].
Spieltrieb, ii. 304[1].
Spinozismus, ii. 584[2].
Spiritismus, ii. 585[2].
Splanchnopleura, ii. 587[1].
Spongioblast, ii. 587[2].
Spontaneität, ii. 587[2], ii. 429[1].
Spore, ii. 588[1].
Sprache, 618[1], 626[1].
Sprache (die verbale), ii. 569[1].
Sprachwissenschaft (vergleichende), ii. 290[1].
Sprechen, 564[1].
Sprung, ii. 484[2].
sprunghafte Entwickelung, ii. 484[2].
Spur, ii. 481[1], 707[2], 763[1].
Staat, 305[2], ii. 593[2].
Staatenbund, 377[2].
Staatsgewalt, 357[1].
Staatsgut, 316[1].
Staatsklugheit, ii. 308[2].
Staatskunst, ii. 309[2].
Staatsrecht, ii. 396[2].
Staatsvertrag, ii. 534[2].
Staatswissenschaft, ii. 594[1].
Stabilität, ii. 592[2].
Stadt, 182[2].
Stamm, ii. 603[2], 715[1]; *184*[2], ii. *480*[1].
Stammeln, 616[2], ii. 593[1], ii. *605*[2].
Stammesgeschichte, ii. 299[2].
Stammesseele, ii. 714[2].
Stärke, 509[2], ii. 604[2].
Starrheit, ii. 475[1].
Starrkrampf, ii. 687[2].
Statik, ii. 601[1].
Statik (soziale), ii. 540[1].
statische Empfindung, ii. 600[2].
statische Oekonomie, ii. 600[1].
Statistik, ii. 601[1].
Statistik (moralische), ii. 106[2].
Statut, ii. 601[2].
Staunen, ii. 820[2].
stehendes Kapital, 386[1].
Stehlsucht, 189[2].
Steigen, ii. 59[2].
steigende Produktivität, 529[2].
steigende Vorstellung, ii. 128[1].
Stellvertretung, 24[2].
stellvertretendes Sühnopfer, ii. 763[1].
stereoskopisches Sehen, ii. 602[1].
Stetigkeit der Naturentwickelung (Theorie der), ii. 726[2].
sthenisch, ii. 603[1].
Stigma, ii. 603[1].
Stil, ii. 605[2].
Stil (Thatsachenstil und potenzierender), ii. 424[1].
Stimmbänder, ii. 802[1].
Stimme, ii. 806[1].
Stimmlosigkeit, 58[2].
Stimmorgane, ii. 802[1].
Stimmung, 488[1], ii. 103[2].
Stoff (lebendiger), ii. 8[2].
Stoff (Materie) und Form, ii. 50[1].
Stoffes (Theorie des psychischen), ii. 86[1].
Stoffwechsel, ii. 71[1].
Stoicismus, ii. 604[1].
Stolz, ii. 339[1].
Störungen der Empfindlichkeit, ii. 517[2].
Stosston, 104[1].
Stottern, ii. 605[2].
Strabismus, ii. 604[1].
Strafe, ii. 397[1], 401[1].
Strafenlehre, ii. 276[1].
Strafrecht, 586[1].
Strahlung, ii. 414[2].
Strang, 197[2].
Streben, 206[2], 207[1], ii. 179[2].
Streben (nach Erlangung eines lustbetonten Zustandes), 62[1].
Streckmuskel, 386[2].
Streit, 16[1], ii. 205[2].
Streit (sozialer), ii. 537[2].
Streitpunkt, 576[2].
strengen Sabbaths-Beobachter (Lehre der), ii. 483[1].
Struktur, ii. 604[2].
Stufe, ii. *606*[2].
Stufen, 392[2].
Stummheit, 300[1].
Stumpfsinnigkeit, 300[1].
Stupidität, ii. 605[1].
Stupor, ii. 605[1].
Subalternation, ii. 606[1].
subconträr, ii. 607[1].
Subjekt, 607[1].
subjektiv, ii. 607[1].
subjektive Empfindungen, ii. 610[2].
subjektive Kosten, 289[2].
subjektive Linien, ii. 611[1].
subjektiver und objektiver Begriff, 463[2].
subjektives Recht, ii. *474*[2].
Subjektivismus, ii. 611[1].
Subjektivität, ii. 611[1]; 457[2].
Subordination, ii. 612[1].
Subsistenz, ii. 612[1].
Substantialismus, ii. 614[1].
Substantialität, *761*[1], *462*[2], 461[2].
Substantialitätstheorie, ii. 614[1].
Substanz, ii. 612[1], 614[1]; 463[2].
Substituirung, ii. 614[2].
Subsumtion, ii. 615[1].
Subvention, ii. 612[1].
Succubus, ii. 615[2].
Suggestion, ii. 619[1].
Sühnopfer (stellvertretendes), ii. 763[2].
Summation, ii. 620[1].
Summationston, ii. 620[2].
Summisten, ii. 620[2].
Sünde, 434[2], ii. 532[2].
Sünden (Vergebung der), ii. 463[1].
Sündenfall, 371[2].
Sündhaftigkeit, ii. 274[2].
Sunniten und Shi'iten, ii. 621[1].
Supererogationswerke, ii. 622[2].
Supernaturalismus, ii. 623[1].
Supposition, ii. 624[2].
Supralapsarianismus, ii. 623[2].
Syllogismus, ii. 628[2].
Symbol, ii. 640[1].
Symbole, ii. 651[2].
symbolisch, ii. 640[1], 651[1].
Symbolismus, ii. 651[1].
Symmetrie, ii. 651[2].
Sympathie, ii. 652[1].
Sympathie (aesthetische), ii. 653[1].
Symptom, ii. 653[2].
Symptomencomplex, ii. *654*[1].
Syn-, ii. 654[1].
Synästhesie, ii. 654[1].
Syncope, ii. 655[2].
Synderesis, ii. 655[2].
Synergie, ii. 658[1].
Synergismus, ii. 657[2].
Synkretismus, ii. 655[2].
Synthese, 175[1], ii. 658[1].
Synthese (psychische), ii. 658[2].
synthetisch, ii. 658[2].
synthetische Philosophie (die), ii. 659[1].
synthetisches Urteil, 43[2].
System, ii. 699[1].
systematische Theologie, ii. 659[2].

Tabes, ii. 660[1].
Tabu, ii. 660[1].
Talbot-Plateau'sches Gesetz, ii. 661[1].
Talmud, ii. 661[2].
Tapferkeit, 393[2].
Tastempfindung, ii. 707[1].
Tastfeld, 382[1].
Taubheit, ii. 625[2].
Taufe, 100[2].
Täufer, 101[1].
Täuschung, 511[2].
Täuschungen (optische), ii. 206[1].
tausendjährigen Reich (Lehre von dem), ii. 79[1].
Tautologie, ii. 663[1].
Taxonomie, 185[2], ii. 663[2].
Teleogonie, ii. 663[2].
Teleologie, ii. 664[1].
teleologischer Beweis, ii. 663[2].
Telepathie, ii. 668[1].
Temperament, ii. 672[2].
Temperatursempfindung, ii. 673[1].
Temperaturpunkt, ii. 673[1].
Temporalzeichen, ii. 673[2].
Tendenz, ii. 674[2]; *207*[1].
Teratologie, ii. 675[2].
Terminus, 407[1], ii. 676[1].
Testament, ii. 686[1], 817[2].
Teufel, 276[2].
That, 11[2].
Thathandlung, 501[2].
Thätigkeit, 12[1], 13[1], 504[1], 573[2], ii. 91[2].
Thätigkeitsgefühl, *14*[1], *61*[2].
Thatsache, 367[2].
Thatsachenstil (potenzierender Stil und), ii. 424[1].
Theil, 565[2].
Theilbarkeit, 290[2].
Theile (Kampf der), ii. **604**[2].
Theilung, 384[1].
Theismus, ii. 688[1].
Thema, ii. 691[2].
Theodicee, ii. 692[1].
Theokratie, ii. 692[1].
Theologie, ii. 692[2].
Theologie (dogmatische), ii. 692[2].
Theologie (moralische), ii. 110[2].
Theologie (natürliche), ii. 137[2].
Theologie (positive), ii. 312[2].
Theologie (praktische), ii. 321[1].
Theologie (systematische), ii. 659[2].
theologische Ethik, ii. 692[2].
Theophanie, ii. 693[1].
Theorem, ii. 693[1].
Theorie, 343[1], ii. 693[1].
Theorie der Gelegenheitsursache, ii. 199[1].
Theorie der psychischen Atomen, ii. 85[2].
Theorie der Seelensubstanz, ii. 557[2].
Theorie der Seelenzellen, ii. 86[1].
Theorie der Wahrnehmung der Farben, ii. 779[2].
Theorie der Wechselwirkung, 168[1].
Theorie der Weltverbesserung, ii. 62[2].
Theorie des psychischen Stoffes, ii. 86[1].
Theorie des Sehens (mosaische), ii. 111[2].
Theosophie, ii. 695[1].
These, ii. 695[1].
Thier, 47[1], 48[1], 193[1].
Thier (einzelliges), ii. 373[1].
Thierchen, 48[1].
thierische Wärme, 47[2].
Thierpsychologie, 48[1].
Thomas von Aquino (Lehre des), ii. 696[1].
Throne (Philosoph auf dem), ii. 290[1].
Tic, ii. 696[2].
Toller, ii. 34[2].
Ton, 181[1], ii. 122[1], 705[1].
Ton (resultirender), ii. 470[1].
Tonfarbe, ii. 706[1].
Tongrösse, *365*[1].
Tonhöhe, ii. 302[1].
Tonica, ii. 706[1].
tonisch, ii. 706[1].
Tonlehre, 181[2].
Tonstösse, 103[2].
Tontaubheit, ii. 705[2].
Tonzeichen, ii. 183[2].
Totalität, 462[2].
Totem, ii. 706[2].
Totemismus, ii. 706[2].
Totenstarre, ii. 475[1].
Tractarianer (die Ansichten der), ii. 707[2].
Tradition, ii. 708[2].
Traducianismus, ii. 709[1].
Träger, ii. *619*[1].
Trägheit, 541[1].
tragisch, ii. 709[1].
Tragzeit, 413[1].
transcendent, ii. 710[2].
transcendental, ii. 710[2]; *594*[2], *595*.
transcendentale Elementarlehre, ii. *21*[2].
transcendentale Erkenntniss, *595*[1].
transcendentaler Gegenstand, 596[2], *596*[1].
Transcendentalismus, ii. 711[1].
Transcendentalphilosophie, *591*[1].
Transcendenz, ii. 710[2].
Transformation, ii. 711[2].
Transformationstheorie, ii. 712[1].
transgredient, ii. 712[1].
Transsubjektive (das), ii. 713[1].
Transsubstantiation, ii. 713[2].
Trauer, ii. 557[1].
Traum, 297[1].
Traumatismus, ii. 713[2].
Träumerei, ii. 472[1].
Tremor, ii. 714[2].
Trieb, 527[1], *206*[2], *407*[2], ii. 511[2].
Triebfeder, 21[2].
Trilemma, ii. 715[1].
Tritheismus, ii. 715[2].
trophische Funktion, ii. 716[1].
Tropismus, ii. 716[2].
Trugschluss, ii. 556[1].
Trunkenheit, 540[2].
Tugend, ii. 764.
typisierender Stil[1], ii. 424[1].
Typus, 290[1], ii. 721[1].

Übel, 352[2].
Übelthat, ii. 38[1].
über, 489[1].
überbewusst, ii. *725*[1].
übereinstimmende Variationen, 193[1].
Übergabe, ii. 708[2].
überindividuell, ii. 251[2], ii. 681[1].
übermenschlich, ii. 623[1].
übernatürlich, ii. 623[1].
Übertragung eines Rechtes, 76[2].
Übertretung, ii. 200[1].
überverdienstliche Werke, ii. 622[2].
Überweisung, 76[2].
Ubication, ii. 723[1].
Uebelverhalten, ii. 87[1].
Ueber-, ii. **681**[1].
Uebereinstimmung, 27[2], 384[2].
Uebergang, *456*[2].
Uebergehung, ii. 338[1].
Ueberleben der Passendsten, 385[2].
Ueberlieferung, ii. 708[2], 712[2].
Uebermass, 546[1].
Uebermensch, ii. 681[1].
Ueberproduktion, ii. 252[1].
Ueberschuss, 355[2].
Ueberseele, ii. 252[1].
Uebersetzung, ii. 712[1].
Uebung, ii. **681**[1], ii. 321[1], ii. 331[2].
Uhrsachen (Mehrheit der), ii. 306[2].
Ultramontanismus, ii. 724[1].
Umfang, 364[2], ii. 414[2], 503[1], ii. *503*[2].
Umfang des Bewusstseins, 381[2].
Umfangsempfindlichkeit, ii. **681**[1].
Umgebung, 328[2].
Umschaffung, ii. 186[1].
Umwelt, 328[2].
Unabhängigkeit, 530[2].
Unangemessenheit, ii. 726[1].
unanwendbar, 575[1].
Unaufmerksamkeit, 528[2].
unbeständiges Gleichgewicht, ii. 743[2].
Unbeständigkeit, 555[1].
unbestimmt, ii. 748[1].
unbewusst, ii. 724[1].
Unbewussten (Philosophie des), ii. 724[2].
unbewusster Zustand, ii. 725[1].
Undenkbare (das), ii. 743[2].
undeutige Zuordnung, *518*[2].
Undurchdringlichkeit, 524[1].

uneigennützige Handlung, 285[2].
Unempfindlichkeit, 39[2].
unendlich, 544[1].
unendliches Urtheil, ii. 6[2].
Unendlichkeit, 545[2].
Unerkennbare (das), ii. 742[2].
Unfähigkeit, 2[1].
Unfehlbarkeit, 541[2].
Unfruchtbarkeit, ii. 602[2].
Ungehorsam, ii. 191[1].
ungeschlechtliche Fortpflanzung, 24[1].
ungeschriebenes Recht, ii. 743[2].
Unglaube, 544[1], 575[2], ii. 724[1].
Unitarianismus, ii. 734[1].
universale Sätze, ii. 739[1].
Universalisten (Lehre der), ii. 741[2].
universalistischer Hedonismus, ii. 742[1].
Unkoordiniertheit, 529[2].
Unlust, ii. 304[2].
Unlust (das Gefühl der Lust und), 591[2].
Unlust und Lust, ii. 678[1].
unlustbringend, 453[2].
Unlustlehre, 453[2].
unmerklich, 525[1].
unmittelbar, 521[1], *457*[2], *458*[1], 459[2], 460[1], 464[1].
Unmittelbare (das), 460[1].
Unmittelbarkeit, 521[2], *456*[2], 459[2].
Unmittelbarkeit (reine), 459[2].
Unmöglichkeit, ii. 313[1].
Unmündiger, 542[2].
unproduktive Consumption, ii. 743[1].
Unrecht, ii. 706[1], 826[2].
unregelmässig, 2[2].
Unsterblichkeit, 523[2].
unter-, 491[1].
Unter- (Begriff, &c.), 37[1].
unterbewusst, ii. 606[1].
Unterbrechungston, 563[2].
Unterdrückung (soziale Auswahl und), ii. 540[1].
Unternehmer, 328[2].
Unternehmergewinn, ii. 357[2].
Unternehmungsform, ii. 219[1].
Unterricht, 310[1], 556[2].
Untersatz, ii. 726[1].
Unterscheidung, 284[2].
Unterschied, 280[1].
Unterschiedsempfindlichkeit, 280[1], ii. 517[1].
Unterschiedsschwelle, ii. 696[2].
Unterthanenpflicht, 33[2].
Unumschränktheit (Gottes), ii. 558[2].
Ununterschiedbaren, 534[1].
Unveränderlichkeit, 524[1].
Unvereinbarheit, 529[1].
unvernünftig, ii. 426[1].
unvernünftige Handlung, 575[1].
unverständlich, ii. *681*[1].
unwillkürliche Thätigkeit, 573[2].
unwirklich, ii. 743[2].
Unwissenheit, 511[1].
Unzulänglichkeit, 528[1].
Ur- (in compounds, as Ursache), ii. 341[1].
Urbewohner, 2[2].
Urbild, 66[2].
Urevangeliumshypothese, 291[2].
Urheberrecht, ii. 480[2].
Urmund, 121[1].
Ursache und Wirkung, 164[1].
Ursamenzellen, ii. 580[2].
Ursprung, 409[2].
Ursprung der Arten, ii. 243[2].
Ursprung des Lebens, ii. 243[1].
ursprünglich, ii. 250[1], 340[1].
Urtheil, 43[2], 580[2], *44*[2], *456*[1], *464*[2].
Urtheil (limitatives), ii. 6[2].
Urtheil (praktisches), ii. 320[1].
Urtheil (sittliches), ii. 105[1].
urtheilen (Vermögen zu), *591*[2].
Urtheilskraft, 580[2], 584[1], *592*[1], 591[2].
Urzeugung, ii. 587[2].
Utilitarier, ii. 745[2].
Utilitarismus, ii. 745[1].
Utopie, ii. 746[2].

variabel, ii. 750[2].
Variation, 193[1], ii. 750[2].
Variationspsychologie, ii. 759[1].
Varietät, ii. 759[1].
vasomotorische Nerven, ii. 759[2].
vasomotorisches Centrum, ii. 759[2].
Vaterherrschaft, ii. 268[2].
Vedas (Religion der), ii. 760[1].
Veitstanz, 176[2].
Velleität, ii. 760[2].
Ventrikel, ii. 760[2].
Verallgemeinerung, 408[1].
Veränderung, 171[2], ii. 485[1].
verantwortlich, 9[1].
Verantwortlichkeit, ii. 468[2].
verbal, ii. 761[2].
Verband, ii. 716[2].
verbessern, ii. 63[1].
Verbesserung, ii. 63[1].
Verbindlichkeit, 301[2].
Verbindung, 198[1], ii. 439[2]; 25[2].
Verbindung disparater Vorstellungsinhalte, *204*[1].
Verbindung mit Gott (innige), ii. 692[1].
Verbindung und Einteilung, 205[1].
verborgen, ii. 199[2].
Verbrechen, ii. 200[1].
Verbreiterung des Eindrucks, *365*[1].
Verbreitung, 287[1], 289[1].
Verdammniss, ii. 278[1].
Verdammung, ii. 465[1].
Verdienst, ii. 69[1].
Verdorbenheit, 286[1].
Verdrehung, ii. 338[2].
Verdruss, ii. 467[2].
Verehrung der Thiere, 48[1].
Verein, 79[1].
Vereinigung, 197[2].
Vereinigung der Kräfte, 205[1].
Verfahren, ii. 356[1].
Verfall, ii. 481[1].
Verfall (sozialer), ii. 538[2].
Verfolgungsvorstellungen, ii. 281[1].
Verfolgungswahnsinn, ii. 281[1].
Verfügung, 321[2].
vergangenen Zeit (Bewusstsein der), ii. 267[2].
Vergebung, ii. 262[2].
Vergebung (der Sünden), ii. 463[1].
Vergehen, ii. 87[1], 200[1].
Vergeltung, ii. 471[1], 472[2].
Vergesslichkeit, 390[2].
vergleichende Psychologie, 201[2].
vergleichende Rechtswissenschaft, 201[2].
vergleichende Religionswissenschaft, 201[2].
vergleichende Sprachwissenschaft, ii. 290[1].
Vergleichung, 202[1].
Vergötterung, 60[2].
Verhältniss, 120[1], ii. 415[1], 439[2], 593[1].
Verjahrungsrecht, ii. 332[1].
Verjüngung, ii. 439[2].
Verkehr, 306[1].
Verknüpfung, 558[1], ii. 439[2]; *558*[2].
Verkündigung, 50[1].
Verlangen, 62[1].
Verletzung, ii. 826[2].
vermischt, ii. 87[2].
vermitteln, 521[2], *458*[1], *459*[1], *461*[2], *464*[1].
vermittelnd, ii. 59[2].
vermittelt, 521[2].
Vermittelung, ii. 59[2]; *458*[2].
Vermögen, ii. 318[2]; 593[2].
Vermögen zu urtheilen, *591*[2].
Vermuthung, ii. 337[2].
verneinend, ii. 148[1].
Verneinung, ii. 146[1].
Vernichtung, 49[2].
Vernunft, ii. 424[2]; *591*[2], *592*[1], ii. *459*[1]; 593[1], 594[2], 597[1], ii. 91[1], 459[2], 726[1].
Vernunft (aus reiner), 591[1], 594[2].
Vernunft (praktische), ii. 320[2].
Vernunfterkenntniss (reine) aus Begriffen, *591*[1].
vernünftig, ii. 415[1], 426[1].
Vernünftige (alles) ist wirklich, und alles Wirkliche ist vernünftig, *461*[2].
Vernunftsvermögen, *588*[1].
Verordnung, 321[2], ii. 212[2], 601[2].
Verpflichtung, 301[2].
Verpflichtung (sittliche), ii. 194[1].
Verrücktheit, 387[1], *550*[1], ii. *261*.
Verschämtheit, ii. 526[2].
verschiedenartig, 286[2].
Verschmelzung, 121[2], 368[1], ii. *640*[1].
Versetzung, ii. 713[1].

Versicherung, 557[1].
Versöhnung, 85[1], ii. 361[1].
Verstand, 558[2], ii. 424[2]; *591*[2], *592*[1], ii. *459*[1]; 592, 593, 594, 596, 597[1], ii. 91[1], 459[2].
Verstand und Vernunft, ii. 725[2].
Verstandesbegriffe, 593[1].
Verstandeswelt, ii. *118*[2].
verständlich, ii. **681**[1].
Versuch, 68[2], 362[1].
Versuch (Meyer'scher), ii. 77[1].
Versuch (Scheiner'scher), ii. 490[1].
Versuchung, ii. 674[2].
Vertheilung, 289.
Vertiefung, 4[2], ii. 509[2].
Verwaltungsrecht, 17[1].
Verwandtschaft, 601[2].
Verwerfung, ii. 465[1].
Verwirrtheit, 529[1], ii. 287[1].
Verwunderung, ii. 820[2].
Verzückung, ii. 709[2].
Verzweiflung, 485[2].
Vexirversuch, ii. 404[1], ii. 404[2].
Vibration, ii. 763[1].
viel, ii. 309[1].
Viele (Eins und), ii. 201[1].
Vielheit, ii. 116[2], 306[2]; *161*[1].
virtuell, ii. 763[2].
Vis viva, ii. 801[2].
Visirlinie, ii. 527[1].
Vitalität, ii. 801[2].
viva (Vis), ii. 801[2].
Vivisection, ii. 802[1].
Volition, ii. 806[1].
Völkerkunde, 348[1].
Völkerpsychologie, 387[2], ii. *386*[2].
Völkerrecht, 564[2].
Volksseele, ii. 714[2].
Volksthum, ii. 128[2].
vollkommene Eingebung, ii. 305[1].
vollkommener Ablass, ii. 305[1].
Vollkommenheit, ii. 278[2].
Vollmachtgeber, ii. 341[2].
Voluntarismus, ii. 807[1].
Voodoo, ii. 809[1].
vor und an sich, *103*[1].
Voraussetzung, 81[1], ii. 315[2], 337[2], 338[1], 624[2], ii. 311[1].
Voraussetzung (selbstverständliche), 596[1].
Voraussicht, 389[2].
Vorbegriff, ii. 324[1].
Vorbestimmung, ii. 331[2].
Vordersatz, ii. 330[2], 371[1].
Vorherbestimmung, 390[1].
vorhergehend, 51[1].
Vorherwissen, 389[2].
Vorläufer, ii. 331[1].
vorläufig, ii. 373[1].
Vorrecht, ii. 343[2].
Vorsatz, ii. 404[1], 678[2], ii. 404[1].
Vorschluss, ii. 370[2].
Vorschrift, ii. 93[2], 212[2].
Vorsehung, ii. 373[1].
vorsokratische Philosophie, ii. 334[1].
vorstellen, ii. 429[2], 679[2].
vorstellend, 499[1].
vorstellende Thätigkeit, 504[1].
Vorstellung, 5[1], 408[2], 464[2], 498[1], ii. 333[1]; *596*[2], *637*[1], ii. *464*[2], *808*[2].
Vorstellung (reproducirte), ii. 464[2].
Vorstellung (steigende), ii. 128[1].
Vorstellungen, ii. 424[2].
Vorstellungen (Mechanik der), ii. *59*[2].
Vorstellungsconcurrenz, *563*[2].
vortäuschen, ii. 37[1].
Vortrefflichkeit, 355[2].
Vorübung, ii. 331[2], 681[1].
Vorwurf, ii. 192[2].
Vorzeichen, 181[1].
vorzeitige Reactionen, 56[1].
Vulgata, ii. 809[2].

Wachsen (Wachsthum), 423[1].
wachsend (steigende Vorstellung), ii. 128[1].
Wahl, 176[1], *206*[2].
Wahlvorgang, ii. 506[2].
Wahnsinn, 387[1], 550[1], ii. *261*.
Wahrhaftigkeit, ii. 761[1].
Wahrheit, ii. 720[2], 463[1].
Wahrheit (Kennzeichen der), ii. 687[1].
Wahrheit (Kriterium der), ii. 687[1].
Wahrheit (nothwendige metaphysische), *595*[1].
Wahrheit und Falschheit, ii. 716[2].
Wahrnehmung, ii. **681**[1]; 56[1], 567[2], ii. 276[2], ii. 277[2].
Wahrnehmung der Farben (Theorie der), ii. 779[2].
Wahrscheinlichkeit, ii. 344[1].
Wahrscheinlichkeitsschluss, ii. 353[2].
Waller'sches Gesetz, ii. 810[2].
Wärme, 47[2], 628[1].
Wärmepunkt, 453[1], ii. 673[1].
Wasserkopf, 488[2].
Weber'sches Gesetz, ii. 812[1].
Wechsel, 117[1], 356[1].
Wechselwirkung, 168[1], 561[2], ii. 429[2]; *161*[1].
Weh, 431[1].
weibisches Wesen, 311[1].
weibliches Wesen, 378[2].
Weisen (die Sieben), ii. 818[2].
Weisheit, ii. 818[1].
Weismannismus, ii. 812[2].
weitherzig, 595[2].
Welt, ii. 118[1], 821[2], ii. 742[1].
Welt (die Seele der), *458*[2].
Weltall (das), ii. 742[1].
Weltanschauung, ii. 822[2], ii. 73[2].
Weltgrund, ii. 822[1].
Weltordnung, ii. 212[1].
Weltseele, ii. 822[1].
Weltsystem (Ptolemäisches), ii. 396[1].
Weltverbesserung (Theorie der), ii. 62[2].
Weltweisheit, ii. *295*[2].
Weltwirtschaft, ii. 20[2].
Werden, 109[1].
Werke, ii. 821[2].
Werke (überverdienstliche), ii. 622[2].
Werth, 56[1], 155[1], 566[1], ii. 749[2], 822[2].
Werthbewegung, ii. *824*[2].
Werthgefühle, ii. 823[2].
Werwolf, ii. 813[2].
Wesen, 25[1], 311[1], 341[2], 378[2], *462*[1], 463[2], 464[1], ii. 91[2].
Wesen des Rechts, *16*[2].
wesentlich, 566[1].
wesentlich eins, *595*[1].
Wesenwille, *407*[2].
Westminster'sches Glaubensbekenntniss, ii. 813[2].
Wetteifer, 321[2].
Wettstreit, ii. 476[1].
Wettstreit der Sehfelder, ii. 470[2].
Widerlegung, ii. 437[2].
Widerspiel, ii. 429[2].
Widerspruchslosigkeit, ii. 687[1].
Widerstand, ii. 468[1].
Widerstandsempfindungen, ii. 468[1].
Widerstandsfähigkeit, ii. 468[1].
Widerstandsgefühl, ii. 468[1]; 111[1].
Widerstreben, 206[2], ii. 179[2].
widerstrebend, 573[2].
Wider-Willkürhandlung, ii. 179[1].
Wiederaufleben (in der Erinnerung), ii. 472[2].
Wiederentwicklung, 577[1].
Wiedererinnerung, ii. 463[1].
Wiedererkennen, ii. 430[1].
Wiedererkennung, ii. 430[1].
Wiedergenesung, ii. 433[1].
Wiederholungsgesetz, ii. 428[2].
Wiedertäufer, 39[1].
wild, ii. 815[2].
Wilde (der), ii. 488[1].
Wille, 407[1], ii. 678[2], 815[2]; *206*[2], 201[1], 206[2], 207[1].
Wille (letzter), ii. 817[2].
Wille zum Glauben, ii. 818[1].
Willenlosigkeit (-schwäche), 2[2].
Willens-, ii. **681**[1]; *206*[2].
Willensdefekte, ii. 816[2].
Willensentschluss, 381[1].
Willenshandlung, ii. 809[1], ii. *179*[2], ii. 681[1].
Willensstörungen, ii. 816[2].
Willensvorgang, ii. 809[1].
Willensziel, ii. 358[2].
Willkür-, ii. **681**[1]; *206*[2].
Willkürhandlung, ii. 179[1], 806[2]; *407*[2], ii. *681*[2].
willkürliche Reproduktion, ii. 432[2].
Willkürvorgang, ii. 806[2].
Windung, 434[2].

wirbellos, 573[1].
Wirbelsaite, ii. 184[2].
Wirbelthier, ii. 762[1].
wirkendes Wesen, 25[1].
wirklich, ii. 420[2] ; *462*[2], ii. *91*[2] ; 461[2].
wirklich (Es ist), 461[2].
Wirkliche (alles) ist vernünftig, und alles Vernünftige ist wirklich, *461*[2].
Wirklichkeit, 14[2], 161[1], *462*[2], ii. 28[1], *91*[2] ; 455[1], 461[2].
wirksame Berufung, 311[1].
Wirkung, 164[1].
Wirkungswerthe, ii. *824*[2].
wirtschaftliches Gut, 199[1].
wissen, *602*[2].
Wissenschaft, ii. 499[1].
Wissenschaft (exakte), ii. 299[2], 499[1].
Wissenschaften (soziale), ii. 539[2].
wissenschaftliche Methode, ii. 500[2].
Witz, ii. 818[2].
Wohl, 407[1].
Wohlfahrt, ii. 813[1].
Wohlgefallen, ii. 304[2].
Wohlgefallen (Missfallen und), ii. 678[1].
wohlgefällig, ii. 304[2].
Wohlgefühl, ii. *813*[1].
Wohlsein, ii. 813[1].
Wohlstand, ii. 811[2].
Wohlthätigkeit, 114[1].
Wohnsitz, 294[1], 436[1].
Wollen, ii. 678[2], 806[1] ; *206*[2].
Wollust, ii. 32[2].
Wort, ii. 821[1].
Wort-Methode, ii. 821[1].
Wortstreitigkeit, ii. 30[2].
Wucher, ii. 745[1].
Wunder, ii. 86[2].
Würdigung, 62[2].
wurmförmige Bewegung, ii. 280[2].
Wurzel, ii. 414[2], 479[2], ii. 480[1].
Wuthanfall, 398[1].
Wuthausbruch, 398[1].

Zahl, ii. 186[2].
Zahl-, ii. 190[1].
Zahlbegriff, ii. 189[1].
Zahldifferenz, ii. 190[1].
Zauber, 174[2].
Zauberei, ii. 35[1], 818[2].
Zeichen, ii. 527[2].
Zeit, ii. 697[2].
Zeit (Bewusstsein der vergangenen), ii. 267[2].
Zeitbewusstsein, ii. 705[1].
zeitlich und ewig, ii. 673[2].
Zeitlosigkeit, *342*[1].
Zeitsinn, ii. 705[1].
Zelle, 59[2], 168[2].
Zellenlehre, 169[1].
Zellkern, ii. 186[2].
Zellkernsubstanz, 598[2].
Zellvermehrung, ii. 359[1].
Zend-Avesta, ii. 828[1].
Zersetzungsmittel, ii. 420[1].
Zerstreutheit, 3[1], 288[2].
Zerstreuungskreise (physiologische), ii. 300[2].
Zeugniss, 92[2], ii. 686[1].
Zeugung, 408[1].
Zeugungsfähigkeit, 379[2].
Ziel, 28[1], 323[2], ii. 678[2] ; *561*[1].
Zifferform, ii. 190[1].
Zins, 563[1].
Zirbeldrüse, 333[2].
Zirbelpolster, *141*[2], 128[2].
zittern, ii. 714[2].
Zone, ii. 828[2].
Zootheismus, ii. 829[1].
Zorn, 46[2], ii. 826[1].
Zoroaster (Lehre von), ii. 829[1].
Züchtung (natürliche), ii. 134[1].
Zuchtwahl (geschlechtliche), ii. 525[1].
Zuckkrampf (klonischer), 190[1].
Zueignung, 64[1].
Zuerkennung, 16[2].
Zufall, 171[2].
zufällig, 7[2], 157[1], ii. *91*[2].
Zugempfindung, ii. 397[1].
Zukunftsgefühl, 399[2].
zum Rechtsverfahren gehörig, 16[2].
Zunahme, 530[1].
zunehmender Gewinn, 281[2].
Zuordnung, *518*[2].
zur Sache gehörig, ii. 287[1].
Zurechnung, 527[2].
zureichenden Grund (Satz vom), ii. 616[1].
Zurückführung, ii. 434[2].
zurückliegend, ii. 463[2].
zusammen, 25[2], 203[2].
zusammenbestehend, 202[2].
zusammengesetzt, 204[1].
zusammengesetzte (Idee), 204[2].
Zusammenklang, 176[2].
Zustand, 62[1], ii. 593[1], 601[2].
Zustand (unbewusster), ii. 725[1].
Zuversicht, 81[1].
Zwang, ii. 469[2].
Zwangsempfindung, *525*[1].
Zwangsgefühl, 111[2].
Zwangsvorstellung, 524[2].
Zweck, 323[2], ii. 678[2], 744[1] ; 561[1].
Zweckmässigkeit, 384[2], *385*[1].
zweideutig, 338[2].
Zweideutigkeit, 36[2], 339[1].
Zweifel, 296[1].
Zweifelsucht, 296[2].
zweihäusig, 282[1].
Zweitheilung, 279[1].
Zweiwillenlehre, 303[1].
Zwerg, 301[2].
Zwischenzeit, 565[1].
Zwischenzustand, 563[2].

IV. INDEX OF FRENCH TERMS

[Prepared by W. J. Shaw, M.A.]

The reference numbers are printed in four different kinds of type: those in black type (**123**) are terms which occur as main topics in the work; those in modern face type (123) are the formally recommended equivalents; those in italic (*123*) are terms of which some exposition or discussion is given; and those in old style (123) are those which have passing mention only, but which are mentioned in a way judged of sufficient importance to require citation.

Under each kind of type the citations from vol. ii follow those from vol. i, and are preceded by the Roman numeral ii (which is not repeated); all other citations are from vol. i.

With the page number the column of the page is given in a small figure; where the small figure is omitted the reference is to both columns.

abaque, 1[1].
abattement, 263[2].
aberration chromatique, 1[2].
aberration mentale, 2[1].
aborigènes, 2[2].
aboulie, 2[2], ii. 816[2].
absence, 3[1].
absolu (l'), 3[1].
absolution, 4[1].
absolutisme, 4[2].
absolutisme esthétique, 4[2].
absorption, 4[2].
absorption en Dieu, ii. 692[1].
abstraction, 6[1].
abstrait, 5[1].
abstraite (idée), 5[1].
absurde, 6[2].
académie, 6[2].
acataphasie, *58*[2], *158*[2].
accélération (loi d') de développement, 7[1].
accent, 7[1].
accentuation, 7[2].
accident(-el), 7[2], 157[1].
accommodation, 7[2], 8.
accord, 176[2].
accord (de trois sons), ii. 714[2].
accord (sentiment d'), 384[2].
accord parfait, ii. 714[2].
accoutumance, 436[1], ii. 681[1].
accumulées (valeurs), 154[2].
accusation, 532[2].
achromatique (sensation), 146[2].
achromatopsie, 9[1], 181[2], 195[1].
achropsie, 195[1].
acoumétrie, 9[2].
acoustique, 9[2].
acquis, 9[2].
acquis (caractères), 10[1].
acquisition (faculté d'), 11[1].
acro-, 11[1].
acte, 11[2].
acte de volition, ii. 806[2].
acte juridique, 11[2].
action, 12[1].
action (chose in), *12*[1], ii. *695*[2].
action de passer une loi, 321[2].
action désintéressée, 285[2].
action et réaction, 12[2].
action involontaire, 573[2].
action irrationnelle, 575[1].
action morale, 211[1].
action réflexe, ii. 436[2].
actives (facultés), 12[2].
activité, 13[1].
activité (propre), ii. 508[2].
activité mentale, 13[2].
actualité, 14[2].
actuel, ii. 420[2].
acuité visuelle (caractères pour l'examen de l'), ii. 686[1].
acumétrie, 9[2].
adaptation, 7[2], 14[2], 15[2].
adaptif, 15[2].
addition latente, ii. 620[1].
additionnel (son), ii. 620[2].
adéquat, 16[1].
adiaphoristique (controverse), 16[1].
administratif (droit), 17[1].
admiration, 17[2].
adolescence, 17[2].
adoptionisme, 18[2].
adoration, 18[2], ii. 822[2].
affectif, 21[2].
affectif (élément), 23[1], *454*[1].
affectif (motif), 21[2].
affection, 21[2], 22[2].
affection nerveuse, ii. 175[2].
affirmation, 23[2].
affirmer, ii. 310[2].
agamogenèse, 24[1].
agence, 24[2].
agent, 25[1].
agglutination, 25[1].
agnosticisme, 26[1].
agoraphobie, 27[1].
agraphie, 27[2].
agréable, 378[2].
agréable ou pénible, 453[2].
agrégat, 25[2], 26[1].
agrégation, 26[1], *79*[2].
agrément, ii. 304[2].
agrément (et peine), ii. 678[1].
agricole (état), 28[1].
aigu, 182[1].
aiguë (manie), 396[2].
alalie, 28[2].
alcoolisme, 29[1].
Alexandrie (école d'), 30[2].
alexie, 32[2].
algèbre de la logique, ii. 640[2].
algédonique (esthétique), 33[1].
algésie, 33[1].
algorithmique (logique), ii. 640[2].
aliénation, 2[1], 33[1].
aliénation mentale, *387*[1].
aliéniste, 33[1].
allégeance, 33[2].
allesthésie, 33[2].
alliances (doctrine des), 240[1].
allochirie, 34[1].
alogie, 34[1].
alphabet, 34[1].
alter (et ego), 312[1].
altérations de la personnalité, ii. 284[2].
alternance de générations, 35[1].
altrui, 35[1], 35[2].
altrui (vivre pour), *36*[1].
altruisme, 35[2].
amaurose, 36[1].
ambiance, 328[2].
ambiantes (conditions), 328[2].
ambidextre, 36[2].
ambiguïté, 36[2].
amblyopie, 36[2].
âme, ii. 557[2], ii. *681*[2], ii. 82[2].
Âme *and* Esprit, ii. **681**[2].
âme du monde, ii. 822[1].
amélioration, ii. 63[1].
améliorer, ii. 63[1].
amétropie, 36[2].
amibe, 37[2].
amimie, 36[2].
amirauté (la compétence de la cour de l'), 17[1].
amitié, 396[2].
amitose, 37[1].
amixie, 37[1].
amnésie, 37[2].
amortissement, 37[2].
amour, ii. 31[1].
amour (l') de soi, ii. 510[2].
amphibologie, 38[1].
amphimixie, 38[1].

ampliatif, 38[1].
amulette, 38[1].
amusie, 38[2].
Anabaptistes, 39[1].
anabolisme, 39[1].
anagogique (interprétation), 40[1].
analgésie, 40[2].
analogie, 41[1].
analogie (de la foi), 42[2].
analogues (organes), 40[2].
analyse, 42[2].
analyse logique, 42[2].
analyse mentale, 43[1].
analyse psychologique, 43[2].
analytique (jugement), 43[2].
analytique (méthode), 45[1].
anaphase, 45[1].
anaphie, 45[1].
anarchisme, 45[1].
anarthrie, 46[1].
ancêtres (culte des), 46[1].
anémie, 39[2].
anérythropsie, 279[2].
anesthésie, 39[2].
anesthésie tactile, 45[1].
anesthésiques, 40[1].
ange, 46[2].
angélologie, 46[2].
angle ascensionnel du regard et angle de déplacement latéral (de l'œil), 47[1].
angle de l'œil, 153[2].
angle facial, 367[1].
animal, 47[1].
animalcule, 48[1].
animalculiste, 48[2].
animale (chaleur), 47[2].
animale (psychologie), 48[1].
animation, ii. 678[1].
animaux (culte des), 48[1].
animaux à sang froid, 193[1].
animaux à température variable, 193[1].
animaux domestiques, 293[2].
animisme, 48[2].
anisométrie, 49[2].
annihilation, 49[2].
annonciation, 50[1].
anodin, 50[1].
anomalie mentale, 50[1].
anonyme (société), 235[2].
anormal, 2[2].
anormale (sensation) de couleur, 181[2].
anormaux (psychologie des), 2[2].
anosmie, 50[2].
antagonisme (musculaire et nerveux), 50[2].
antagonisme des champs visuels, ii. 470[2].
antagonistes (poisons), 50[2].
antagonistique (couleur), 51[1].
antécédent, 51[1].
antéchrist, 55[2].
antenne, 51[1].
anthropoïdes, 51[1].
anthropologie, 52[2].
anthropologie générale, 53[1].
anthropométrie, 54[2].
anthropomorphisme, 55[1].
anticipation, 56[1].
anticipée (réaction), 56[1].
antinomie, 56[2].
antinomisme, 56[1].
antipathie,-57[1].
antithèse, 57[1].
antivivisectionnistes (folie des), ii. 262[1].
anxiété, 57[1].
anxieux (délire), 57[1].
apathie, 57[2].
aphacie, 58[1].
aphasie, 58[1].
aphasie de Broca, 58[1].
aphasie motrice, 58[1].
aphasie sensorielle, 58[1].
aphémie, 58[2].
aphonie, 58[2].
aphrasie, 58[2].
Apocalypse, 59[1].
apodictique, 59[1].
apogamie, 59[1].
apolaire (cellule), 59[2].
Apollinarisme, 59[2].
apologétique, 60[1].
apoplexie, 60[1].
apothéose, 60[2].
appareils, 605[1].
apparents (méridiens verticaux), 276[2].
apparition, 61[1].
apperception, 61[1].
appétit, 62[1].
appétition, 62[1].
appréciation, 62[2].
appréhension, 62[2].
appréhension de l'identité matérielle, 505[2].
apprentissage, 63[2].
approbation morale, 63[2].
appropriation, 64[1].
appropriation (instinct d'), 11[1].
apraxie, 64[1].
aprosexie, 6[2], 64[2].
apte (survivance du plus), 385[2].
aptitude, 64[2].
arbitrage, 65[1].
arbitral (jugement), 97[2].
arborisation, 65[2].
arbre de Porphyre, ii. 714[1].
archéologie (préhistorique), 65[2].
archétype, 66[2].
architecture, 67[1].
argent, ii. 99[2].
argument, 67[1].
argument ontologique, ii. 202[2].
argument téléologique, ii. 663[2].
arguments de casuiste, 157[1].
Arianisme, 67[1].
aristocratie, 67[2].
Aristote (expérience d'), 68[2].
arithmomanie, 68[2].
Arminianisme, 68[2].
arrêt, 16[2], 547[2].
art, 69[2].
art (théories de l'), 69[2].
art décoratif, 258[1].
artère, 73[2].
articulaire (sensation), 73[2], 580[1].
articulation, 74[1].
artificielle (sélection), 74[1].
Aryen, 74[2].
ascensionnel (angle) du regard, 47[1].
ascétisme, 74[2].
asémie, 76[1].
asexuée (génération), 24[1].
aspiration, 76[2].
assentiment, 76[2].
assertion, 76[2].
assimilation, 76[2].
assistance publique (système d'), ii. 309[1].
association, 79[1], 79[2].
association (d'idées), 78[1].
association par contiguité (loi d'), 224[1].
association par contraste (loi d'), 228[2].
associationisme, 80[1].
associée (sensation), 209[1].
associés (mouvements), 217[2].
assomption, 81[1].
assurance, 81[1], 557[1].
asthénie, 81[2].
asthénopie, 81[2].
astigmatisme, 81[2].
asymbolie, 82[1].
asymétrie, 82[1].
asynergie, 82[2].
atavisme, 83[1].
ataxie, 83[1], 529[2].
Athanase (symbole d'), 84[1].
athéisme, 84[1].
atomes mentaux (théorie des), ii. 85[2].
atrophie, 85[2].
attaque, 384[2], ii. 604[2].
attente, 359[2].
attention, 85[2].
attention (distraction de l'), 288[2].
attention (oscillations de l'), 387[1].
attitude, 88[2].
attraction et répulsion, 89[2].
attractive (sphère), 170[2].
attrape, ii. 404[1].
attribut, 90[1], ii. 43[1], 325[2].
attribution, ii. 326[1].
attributs de Dieu, 90[1].
attrition, 90[2].
auditifs (défauts), 452[1].
audition, 443[1].
audition binauriculaire, 117[2].
audition colorée, 91[1], 181.
auditive (illusion ou hallucination), 9[2].
auditive (sensation), 451[1].
auditives (localisation des sensations), ii. 20[1].
Augustinianisme, 91[1].
aura, 92[1].
auteur, ii. 341[2].
authenticité, 92[2].
autocratie, 93[1].
auto-détermination, ii. 217[1].
automatique, 93[2].
automatique (écriture), 94[2].
automatisme, 93[2].

automatisme psychologique, 95[1].
autonomasie, 55[2].
autonomie, 95[2].
auto-régulation, ii. 217[1].
autoritative (règle esthétique), 21[2].
autorité, 92[2].
auto-suggestion, 96[1].
autre (l') (et le moi), 312[1].
avènement, 19[1].
avenir (sentiment de l'), 399[2].
avent, 19[1].
Averrhoïsme, 96[2].
aversion, 97[1].
avertissement, ii. 331[1].
aveugle (tache), 121[2].
avis, ii. 204[2].
avocat, 19[1].
avulsion, 366[1].
axe cérébrospinal, ii. 171[1].
axe de l'œil, ii. 206[1].
axiome, 97[2].

Baer (loi de), 100[1].
balance du commerce, 100[2].
balbutiement, 616[2].
Bâle (Confession de), 102[1].
baptême, 100[2].
Baptistes, 101[1].
baquet, 245[2].
baroque, 101[2].
barreau (du), 390[1].
basse vue, ii. 142[2].
bâtonnet, 181[2].
battements, 103[2].
beau (le), 104[1].
beau (science du), 20[1].
beauté, 104[1].
beauté (ligne de), ii. 8[1].
bécarre (signe de), 181[1].
bégaiement, ii. 593[1], 605[2].
belge (Confession), 109[2].
bémol (signe de), 181[1].
Bénédictins, 113[2].
bénéfice, ii. 357[2].
bénéfice diminuant (et croissant), 281[2].
besoin, ii. 146[1].
besoin physique, 62[1].
besoins, ii. 811[1].
Bible, 115[2].
biblique (critique), 115[2].
biblique (psychologie), 116[1].
biblique (théologie), 116[2].
bien, 199[1], 416[2].
bien (souverain), 477[1].
bien-être, ii. 813[1].
bienfaisance, 114[1].
bien général, 407[1].
biens, 417[1], ii. 360[2].
binauriculaire (audition), 117[2].
binoculaire (contraste), 228[1].
binoculaire (mélange) des couleurs, 197[1].
binoculaire (vision), 117[2].
biogenèse, 117[2].
biogénétique, 118[1]; (loi), 118[1].
biologie, 119[2].
biologique (continuité), 117[2].
biomécanique, 276[1].
bionomie, 120[1].
bionomiques (forces), 119[2].
biophores, 120[1].
blasphème, 120[2].
blastocèle, 121[1].
blastoderme, 121[1].
blastomère, 121[1].
blastophore, 121[1].
blastosphère, 121[1].
blastula, 121[2].
bon, 416[2].
bonheur, 350[2], 378[2], 441[1].
bonheur (qui donne le), 378[2].
bonheur (visant au), 378[2].
bonheur suprême, 422[1].
bonne humeur, 488[1].
bonté, 417[1].
Bouddha, 147[1].
brachy-, 125[2].
Broca (aphasie de), 58[1].
bruit, 179[1].
brut (produit), 431[2].
bulbe, 147[2].
but, 28, 323[2], ii. 678[2].
Byzantin, 148[1].

cabale, 149[1].
cadence, 149[2].
calcul (infinitésimal), 150[1].
calcul des observations, ii. 198[2].
Calvinisme, 150[2].
canaille, ii. 89[1].
canon, 152[2].
canon (droit), 153[1].
canonisation, 153[2].
canthus (grand), 153[2].
canthus (petit), 153[2].
capacité, 2[1], 153[2].
capacité cranienne, 153[2].
capital, 154[1].
capitaux circulants, 183[1].
capitaux fixes, 386[1].
caractère, 173[2].
caractères acquis et innés, 10[1].
caractères pour l'examen de l'acuité visuelle, ii. 686[1].
caractères sexuels (primaires et secondaires), ii. 524[1].
caractéristique, 173[2].
cardinales (vertus), 155[1].
cardinaux (valeur et point), 155[1].
carême, 19[1].
caricature, 155[2].
cariocinèse, 598[2].
carioplasme, 598[2].
Carmélites, 155[2].
carrés (méthode des moindres), 340[1].
caste, 156[2].
casuiste (arguments de), 157[1].
casuistique, 157[1].
catabolisme, 598[2].
catalepsie, 158[1].
cataphasie, 158[2].
cataplexie, 159[1].
catatonie, 598[2], 599[1].
catégorématique, 159[2].
catégorie, 160[1], ii. 325[2].
catégorique, 159[2].
catégorique (impératif), 160[1].
catharsis, 161[2].
catholicité, 163[1].
catholique (Église), 162[1].
catholique (réaction), 162[2].
catholique romaine (Église), ii. 478[2].
cauchemar, ii. 177[2].
causalité, 163[1].
cause, 163[1], 219[1].
cause (notion de), 163[2].
cause et effet, 164[2].
causes (droit des), 156[1].
causes (pluralité des), ii. 306[2].
causes occasionnelles (hypothèse des), ii. 199[1].
cavité du corps, 192[1].
cécité, 122[1].
cécité mentale (*or* psychique), 123[1].
cécité musicale (*or* notale), ii. 183[2].
cécité psychique, ii. 192[1].
célibat, 168[1].
cellulaire (théorie), 169[1].
cellule, 168[2].
cellule apolaire, 59[2].
cellule ganglionnaire, 405[1].
cellule spermatique, ii. 580[2].
cellulifuge, 169[2].
cène (sainte), 349[2].
cénesthésie, 192[2].
central, 169[2].
centre, 169[2].
centre de masse, de gravité, 169[2].
centre de rotation (de l'œil), 170[1].
centre vasomoteur, ii. 759[2].
centrifuge et centripète (force), 170[1].
centripète (force centrifuge et), 170[1].
centrosome, 170[2].
ce qui doit être, ii. 251[2].
ce qu'on ne peut connaître, ii. 742[2].
cercle chromatique, 196[2].
cercle de Müller, ii. 116[2].
cercle de sensation, ii. 519[2].
cercle vicieux, 183[2].
cérébrales (localisations), ii. 15[2].
cérébrales (vésicules), 170[2].
cérébrospinal (axe), ii. 171[1].
certitude, 170[2], 171[1].
cerveau encéphale, 126[1].
cession, 76[2].
chagrin, 431[1].
chaire (Socialistes en), ii. 542[1].
chaleur animale, 47[2].
chaleur latente, 628[2].
chamanisme, ii. 525[2].
champ de la conscience, 381[2].
champ de regard, 381[2].
champ tactile, 382[1].
champ visuel, 382[1].
champs visuels (antagonisme des), ii. 470[2].
chance, 171[2].
change (une lettre de), 117[1].
changement, 171[2].
chant intérieur, 564[1].

charité, 174[1].
charme, 174[2].
charmer, 174[2].
charnel (et spirituel), ii. 587[1].
charte, 175[1].
chasteté, 175[1].
châtiment, ii. 397[1].
chatouillement, ii. 697[1].
chaud (point), 453[1], ii. 673[1].
chaude (fièvre), 396[2].
Chiites (et Sunnites), ii. 621[1].
chiliasme, 175[2].
chimique (synthèse), 175[1].
chiromancie, 176[1], ii. 255[1].
choc, ii. 526[1].
choix, 176[1].
chorée, 176[2].
chorée saltatoire, 252[2].
chose, ii. 695[1].
chose en soi, 282[1].
chose in action, *12*[1], ii. 695[2].
choses (leçons de), ii. 192[1].
choses in action, 76[2].
choses prémises (les), ii. *330*[2].
chrétienne (conscience), 177[2].
Christ, 176[2].
Christ (humiliation de), 487[2].
Christianisme, 177[2].
Christologie, 178[1].
Christophanie, 180[2].
chromatique, 181[2].
chromatique (aberration), 1[2].
chromatique (cercle), 196[2].
chromesthésie, 181[1].
chromosome, 181[2].
chronique, 182[1].
chrysalide, 182[1].
chute, 371[2].
ciel, 453[2].
cieux, 453[2].
cinématique, 601[2].
cinétique, 601[2].
circonvolution, 434[2].
circulaire, 183[1].
circulaire (délire), ii. 279[2].
circulaire (folie), 35[1], *387*[1].
circulants (capitaux), 183[1].
circulation, 183[2].
Cistercien, 183[2].
citoyen, 184[1].
civil, 184[1].
Civil (Code), *191*[1].
civil (droit), 184[1].
civil international (droit), 211[2].
civilisation, 247[2].
clair et distinct, 189[1].
clairvoyance, 184[1].
clan, 184[2].
clarté, 189[1].
classe, 185[1].
classe (conscience de), 217[1].
classe (sociale), 185[1].
classification, 185[2].
cleptomanie, 189[2].
clonique (convulsion), 190[1].
clonus du pied, 49[2].
coadaptations, 190[1].
coadaptives (variations), 190[1].
coalition, 197[2].
code, 190[2].
Code Civil, *191*[1].
Code Napoléon, *191*[1], *226*[1].
Code Pénal, 191[2].
coefficient, 191[2].
cœlentérés, 192[1].
cœlomata, 192[2].
cœlome, 192[1].
cœur, 453[1].
coexistence, 192[2].
coin de l'œil, 153[2].
coïncidence, 192[2].
coïncidentes (variations), 193[1].
colère, 46[2].
collapsus, 193[2].
collatérales, 193[2].
collectif, 193[2].
collectivisme, 193[2], *193*[2].
collectivité, *193*[2].
colligation, 194[1].
colonie, 194[1].
colonne, 197[2].
coloré (ton), 197[1].
colorée (audition), **91**[1], 181[1].
combinaison, 198[1].
combinaison (ton de), 198[1].
comique, 198[2].
commerce, ii. 708[1].
commerce (balance du), 100[2].
commissure, 199[1].
commun, 199[2].
commun (droit), 199[2].
commun (sens), 200[1].
communauté, 200[2], 235[2].
communisme, 200[2].
compagnie, 79[1], 201[1], *201*[1].
compagnon, ii. 548[2].
comparaison, 202[1].
comparée (jurisprudence), 201[2].
comparée (psychologie), 201[2].
comparées (religions) (science des), 201[2].
compatibilité, 27[2].
compatible, 202[2].
compensation, 202[2].
compétence (la) de la cour de l'amirauté, 17[1].
complémentaire (couleur), 203[2].
complexe, 203[2], 204[1].
complication, 204[1].
composé, 204[1], ii. 87[2].
composé (mental), 205[2].
composée (idée), 204[2].
composée (image), 408[2].
composition de l'esprit (théorie de la), 205[2].
composition des forces, 205[1].
composition et division, 205[1].
compréhension, 206[1].
compréhension (la), ii. 411[1].
compromis, 206[1], 65[1].
comptable, 9[1].
concentration, 207[2].
concept, 208[1].
concept de nombre, ii. 189[1].
conception, 208[1].
conception immaculée (dogme de), 520[1].
conception universelle, 208[1].
conceptuel, 208[2].
conclusion, 209[1].
concomitance, 209[1].
concordance (méthode de), 27[2].
concret, 209[2].
concupiscence, 209[2].
concurrence, 77[1], 202[2].
concurrence vitale, 358[1].
condensation de l'ontogenèse, ii. 526[2].
condition, 210[1], ii. 593[1].
condition nécessaire, ii. 143[1].
condition suffisante, ii. 143[1].
conditionné, 210[1].
conditionnelle (immortalité), 210[2].
conditions ambiantes, 328[2].
confession, 211[1], 243[1].
Confession belge, 109[2].
Confession d'Augsbourg, 91[1].
Confession de Bâle, 102[1].
Confession de Westminster, ii. 813[2].
confirmation, 211[2].
conformateur, 615[2].
conformité, 385[1].
confusion, 212[1].
confusion mentale, 212[2].
congénital, 212[2].
congestion, 212[2].
congruence, 213[1].
congruence (sentiment de la), 384[2].
conjugaison, 213[1].
connaissance, 192[2], 602[2].
connaissance (relativité de la), ii. 450[2].
connaissance de soi, ii. 510[2].
connaissance (la) des affaires relatives à la marine, 17[1].
connaissance du monde extérieur, 365[2].
connaissance du temps passé, ii. 267[2].
connaissance profonde, 554[1].
connaître (ce qu'on ne peut), ii. 742[2].
conné, 214[2].
connexion, 214[2].
connotation, 214[2].
consanguinité, 601[2].
conscience, 215[1], 216[2], *215*[1].
conscience (champ de la), 381[2].
conscience (élément de la), 313[2].
conscience (état de), ii. 598[2].
conscience (morale), 215[1].
conscience (unité de la), ii. 68[1].
conscience chrétienne, 177[2].
conscience de classe, 217[1].
conscience de similitude, 217[1].
conscience de soi-même, ii. 509[1].
conscience religieuse, ii. 462[2].
conscience sociale, ii. 534[1], 715[1].
conscient (réflexe), ii. 436[1].
consécutive (image), 23[2].
consécutive (sensation), 24[1].
consentement, 217[2].
conséquence, 218[1].
conséquent, 218[2].
conservation, 218[2], ii. 470[2].
conservation des forces (de l'énergie), 218[2].
conservation personnelle, ii. 511[2].

conservatisme, 219[1].
consistance, 219[1].
consolidation, 398[1].
consommateur, 221[2].
consommation, 222[1].
consommation improductive, ii. 743[1].
consonance, 219[2].
constante (erreur), 219[2].
constante (loi d'orientation), ii. 242[2].
constitution, 219[2], 220[1].
constitutionnelle (loi), 220[2].
constructive (fonction), 221[2].
consubstantiation, 209[1].
contact (sensation de), 222[2].
contagion (sociale et mentale), 222[2].
contemplation, 223[2].
contenu, 223[2].
contiguité (loi d'association par), 224[1].
contingent, 224[1].
continuité, 224[1].
continuité biologique, 117[2].
contractilité, 226[2].
contraction, 226[2].
contradiction (principe de), 226[2].
contrainte, 221[1], ii. 469[2].
contraposition, 227[1].
contraste, 227[1].
contraste (loi d'association par), 228[2].
contraste binoculaire, 228[1].
contraste simultané des couleurs, 228[1].
contraste spacial optique, 229[1].
contraste successif des couleurs, 228[2].
contrat, 225[2].
contrat social, ii. 534[2].
contravention, ii. 87[1], 200[1].
contre-irritation, 239[1].
contre-nature, ii. 338[2].
contre-stimulus, 239[1].
contre-volontaire, 573[2].
contrôle, 229[1].
contrôle (expérience de), 230[1], ii. 404[1].
controverse adiaphoristique, 16[1].
convalescence, ii. 433[1].
convenable, ii. 359[2].
convenance, 27[2], 384[2], 385[1].
convenance (droit de), 199[1].
convenances, ii. 359[2].
convention, 230[2].
convergence, 230[2].
conversion, 232[2], 398[1], ii. 199[1].
conviction, 233[1].
convoitise, ii. 32[2].
convulsif (tic), ii. 566[2].
convulsion, 233[1].
convulsion clonique, 190[1].
Convulsionnaires, *268*[2].
coopération, 209[2], 233[2], 234[1].
coordination, 234[1].
Copernic (théorie de), 234[2].
copie, 235[1].
copie (droit de), ii. 480[2].
coprolalie, 234[2].
copule, 234[2].
coquetterie, 240[2].
Coran, 603[2].
corde dorsale, ii. 184[2].
cordes vocales, ii. 802[1].
cordon, 197[2].
corne, 235[1].
corollaire, 235[2].
corporation, 235[2].
corps, 124[1], 236[2].
corps (cavité du), 192[1].
corps (esprit de), *341*[1].
corps (sens du), 199[2].
corps (le) et l'esprit, ii. 82[2].
corpuscule, 236[2].
corrélation, 236[2].
correspondants (points), 237[2].
cosmogonie, 237[2].
couleur, 194[2], 197[1].
couleur (sensation anormale de), 181[2].
couleur (sensation de), 197[1].
couleur antagonistique, 51[1].
couleur complémentaire, 203[2].
couleur du son, 195[1].
couleur fondamentale, 195[1].
couleurs (contraste simultané des), 228[1].
couleurs (contraste successif des), 228[2].
couleurs (mélange binoculaire des), 197[1].
couleurs (mélange des), 196[2].
couleurs (sensations des), *146*[2].
couleurs (table des), 196[2].
couleurs (théorie de la perception des), ii. 779[2].
couleurs (triangle des), 197[2].
couleurs protectrices, ii. 811[2].
coulpe, *247*[1].
couple, 239[1].
cour, 240[1].
cour (la) de l'amirauté (la compétence de), 17[1].
courage, 239[2], 393[2].
courbe, 249[2].
courbes (méthode des), 420[1].
courbure, 386[2].
couronne rayonnante, ii. 414[2].
courroux, ii. 826[1].
coutume, 250[1].
coutumier (droit), 199[2].
crainte, 375[2].
crampe des écrivains, ii. 826[2].
cranienne (capacité), 153[2].
craniologie, 240[2].
craniométrie, 240[2].
création, 241[2].
création (théorie de la), 242[1].
créationisme, 242[1].
créative (fonction), 221[2].
crédit, 242[2].
crédulité, 242[2].
crétinisme, 243[1].
crime, 243[2], ii. 200[1].
criminel, 244[1].
criminologie, 245[1].
crise, 245[2].
crises (salle des), *245*[2].
cristal (vision au), 247[1].
cristalloscopie, 247[1].
critérium, 245[2].
critérium de la vérité, ii. 687[1].
critérium esthétique, 245[2].
criticisme, 246[1].
critique biblique, 115[2].
croche, 181[1].
croire (volonté de), ii. 818[1].
croissance de sociabilité, ii. 543[1].
croissance psychique, 433[1].
croissant et diminuant (bénéfice), 281[2].
croyable, 242[2].
croyance, 110[1].
culpabilité, 247[2], 434.
culte, 248[2], ii. 822[2].
culte du feu, 383[2].
culte de la nature, ii. 142[2].
culte des ancêtres, 46[1].
culte des animaux, 48[1].
culte des héros, 475[2].
culte des images, 516[2].
culture, 247[2].
culture (époques de), 248[2].
culture (loi de la), 281[2].
culture (marge de), ii. 41[2].
curiosité, 249[1].
cutanée (sensation), 250[2], 271[1], ii. 533[1].
cuticule, 251[1].
cyclopéen (œil), 251[1].
cyclose, 251[1].
cylindre-axe, 98[2], ii. 171[1].
cytologie, 251[2].
cytoplasme, 251[2].

Daltonisme, 252[1].
danse de Saint-Guy, 176[2].
Darwinisme, 253[1].
débiteur principal, ii. 341[2].
débouchés (loi des), 529[2].
décadence, 256[2].
décadence sociale, ii. 538[2].
décalogue, 256[2].
décision, 257[1], ii. 678[2].
décision volontaire, 381[1].
déclinaison, 257[2].
décoratif (art), 258[1].
découverte, 284[2].
décussation, 258[1].
déduction, 258[2].
défauts de l'ouïe (*or* auditifs), 452[1].
défectuosité (mentale), 258[2].
définition, 259[1].
déformation, 260[1].
dégénérés (folie des), *260*[2].
dégénérescence, 260[1].
dégénérescence Wallerienne, ii. 810[2].
déglutition (mouvement, *or* réflexe, de), ii. 626[1].
degré, 263[2].
degré et genre, 601[1].
degrés formels, 393[2].
déisme, 263[2].
délamination, 263[2].
délibération, 263[2].
délirantes (idées) de persécution, ii. 281[1].

délire, 264[1].
délire anxieux, 57[1].
délire circulaire, ii. 279[2].
délire de négation, ii. 61[2], 654[1].
délire de possession, ii. 313[1].
délire des grandeurs, 420[1].
délire émotif, 57[2].
délit, 243[2], ii. 87[1], 200[1], 706[1], 826[2].
demande, 265[1].
demande (offre et), ii. 623[2].
demande réciproque, ii. 429[2].
démence, 265[2], 550[1].
démérite, 266[1].
demi-ton, 181[1].
démocratie, 266[1].
démographie, 266[2], *266*[2].
démon, 267[1].
démonolatrie, 267[1].
démonologie, 267[2].
démonomanie, 149[2], 268[1].
démonstration, 268[2].
démoralisation, 269[1].
dendrite, 269[1].
dendrites (sans), 16[1].
dénomination, 269[2].
dénotation, 269[2].
densité, 270[1].
déontologie, 270[1].
dépendance, 270[1], 530[2].
dépense, 360[2].
déplacement latéral (angle de), 47[1].
dépréciation, 270[1].
dépression, 123[2], 270[2].
dépression (neurasthénique, &c.), 253[2].
déraisonnable, ii. 426[1].
dérangement d'esprit, 271[1].
dérivation, 271[1].
dernier, ii. 723[2].
dernier (jugement), 584[1].
des, ii. 555[2].
désagrégation, 288[1].
désagrément, ii. 304[2].
descendance (théorie de la), 271[2].
description, 271[2].
désespoir (espérance et), 485[2].
désharmonie, 285[2].
désintégration, 285[2].
désintéressée (action), 285[2].
désir, 272[1].
désobéissance, ii. 191[1].
désordre moral, 286[1].
despotisme, 272[2].
dessein, 272[1], 561[1], ii. 404[1], 678[2].
désuétude, 273[1].
désuétude (usage et), ii. 744[2].
déterminants, 273[1].
détermination, 273[2], ii. 326[1].
détermination par soi-même, ii. 509[2].
déterminé, 273[1].
déterminisme, 274[1].
deutoplasme, 274[2].
développement, 274[2].
développement (loi d'accélération de), 7[1].
développement (psychoses du), 275[1].
développement mental, 354[2], ii. 67[1].
développement psychique, 433[1].
devenir, 109[1].
déviation, 276[1].
déviation des méridiens verticaux apparents, 276[2].
devoir, 301, ii. 251[2].
devoirs (théorie des), 270[1].
dextralité, 277[1], ii. 475[1].
diable, 267[1], 276[2].
diacoustique, 278[1].
diagnostic, 278[1].
diagramme logique, ii. 28[1].
diagramme numérique, ii. 190[1].
dialectique, 278[1].
diamètre, 278[2].
dianoétique, 278[2].
diapason, ii. 302[1].
diathèse, 279[1].
dichotomie, 279[1].
dichromatopsie, 279[2].
didactique, 279[2].
dièse (signe de), 181[1].
Dieu (absorption en), ii. 692[1].
Dieu (attributs de), 90[1].
Dieu (éternité de), 342[2].
Dieu (Fils de), ii. 556[1].
Dieu (idée de), 415[1].
Dieu (sainteté de), 482[2].
Dieu (souveraineté de), ii. 559[1].
Dieu (unité de), ii. 737[1].
Dieu (le) en trois personnes, ii. 715[2].
différence, 280[1].
différence (sentiment de), 280[1].
différences (méthode des), 280[2].
différences (sensibilité aux), ii. 517[1].
différences à peine perceptibles (méthode des), 280[2].
différenciation, 281[1].
différent (le même et le), ii. 484[2].
différentiel (son), 281[1].
difformité, 260[1].
dilemme, 281[2].
diminuant et croissant (bénéfice), 281[2].
dimorphisme, 282[1].
dioïque, 282[1].
dioptrique, 282[2].
diplogenèse, 283[1].
diplopie, 283[1], 296[1].
dipsomanie, 283[2].
directeur (principe), ii. 1[1].
direction, 283[2].
direction (ligne de), ii. 8[1].
direction (rayon de), ii. 417[1].
discernement, 284[1].
discipline, 284[1].
discontinuité, ii. 484[2].
disconvenance, ii. 726[1].
discret, 284[2].
discrimination, 284[2], ii. 517[1].
discursive (pensée), 285[1].
disjonctif, 286[1].
disparate, 286[2].
dispensation, 287[1].
dispense, 287[1].
disposition, 287[2], ii. *679*[2].
disposition émotionnelle, 317[2].
dissémination, 287[1].
dissociation, 288[1].
dissonance, 284[1], 288[2].
distance (perception visuelle de la), 270[2].
distance ponctuelle, ii. 308[1].
distinct (clair et), 189[1].
distinction, 284[2].
distraction, 3[1], 288[2].
distraction de l'attention, 288[2].
distribution, 289.
distribution géographique, 289[1].
divin (droit), 290[1].
divin (gouvernement), 418[2].
divin (type), 290[1].
divination, ii. 35[1].
divine (lèse-majesté), ii. *3*[1].
divinité, 415[2].
divisibilité, 290[2].
division, 290[2].
division (composition et), 205[1].
division (principe de), 398[1].
division du travail, 291[1].
division réductionnelle, ii. 435[2].
docétisme, 291[1].
doctrine de la foi, ii. 301[2].
doctrine de l'influx (physique), *or* de l'influence naturelle, 168[1].
doctrine de Ritschl, ii. 475[2].
doctrine des alliances, 240[1].
dogmatique, 292[2].
dogmatique (théologie), ii. 692[2].
dogmatisme, 292[2].
dogme, 291[2].
dogme de conception immaculée, 520[1].
dol, 293[1].
dolichocéphale, 293[1].
domaine, 266[1].
domaine éminent, 316[1].
domestique, 293[2].
domestiques (animaux), 293[2].
domicile, 294[1].
Dominicains, 294[1].
donation, 294[2].
Donatistes, 294[2].
Donders (loi de), 295[1].
donnée (la), 414[1].
dorsale (corde), ii. 184[2].
doubles (images), 296[1].
douleur, 293[1].
douleur (points de), ii. 254[2].
douleur (sensation de), ii. 254[1], 678[1].
douleur et plaisir, ii. 253[1], 678[1].
doute, 296[1].
doute (folie du), 296[2], *387*[1], ii. 262[1].
droit, 640[1], ii. 474[1], ii. *474*[2].
droit (maxime de), ii. 55[2].
droit (philosophie sociale du), ii. 594[1].
droit administratif, 17[1].
droit canon, 153[1].
droit civil, 184[1].
droit civil international, 211[2].
droit commun, 199[2].
droit coutumier, 199[2].
droit de convenance, 199[1].

droit de copie, ii. 480[2].
droit des causes, 156[1].
droit divin, 290[1].
droit écrit, ii. *744*[1].
droit international, 564[2].
droit international privé, 211[2].
droit non écrit, ii. 744[1].
droit objectif, ii. 193[2].
droit positif, ii. 312[1].
droit privé, ii. 343[2].
droit public, 220[2], ii. 396[2].
droit romain, ii. 478[1].
droitier, 277[1].
droits naturels, ii. 134[1].
droiture, ii. 744[1].
Druses, 297[2].
dualisme, 298[1].
durée, ii. 615[1].
durée de travail, 486[2].
durée minimale, 300[2].
dynamique, 302[1].
dynamique (économie), 301[2].
dynamique sociale, ii. 534[2].
dynamogénie, 302[1].
dynamogénique, 302[1].
Dyophysites, 302[2].
dyothélisme, 303[1].
dys-, 303[2].
dyschromatopsie, 195[1].

ébauche, ii. 480[1].
Ébionites, 304[1].
eccéité, ii. 695[2].
échange, 356[1].
échange mutuel, ii. 124[1], 429[2].
échanges nutritifs, ii. 71[1].
écholalie, 305[1].
éclairage (intensité d'), 146[2].
éclaircissement, **305**[1].
éclampsie, 305[2].
éclectisme, 305[2].
école d'Alexandrie, 30[2].
école normale, ii. 183[1].
écoles philosophiques de la Grèce, ii. 495[2].
économie (principe d'), 309[1].
économie dynamique, 301[2].
économie mathématique, ii. 47[1].
économie politique, 307[1].
économie statique, ii. 600[1].
économique (liberté), 305[2].
économique (loi), 306[1].
économique (méthode), 306[2].
économique (motif), 307[1].
économiques (harmonies), 306[1].
économiques (services), ii. 522[1].
écrit (droit), ii. *744*[1].
écrit (droit non), ii. 744[1].
écriture, 440[2].
écriture automatique, 94[2].
écriture en miroir, ii. 86[2].
Écritures, ii. 503[2].
écrivains (crampe des), ii. 826[2].
ectoderme, 310[1].
ectoplasme, 310[1].
éducation, 310[1].
éducation formelle, 392[1].
efférent, 311[1].
effet et cause, 164[2].
effets psychiques des poisons, ii. 376[1].
effort mental (sentiment de l'), 311[2].
effort moteur (sentiment de l'), 311[2].
égal (sensation d'), ii. 480[1].
égalité, 337[1].
église, 182[1].
Église catholique, 162[1].
Église catholique romaine, ii. 478[2].
église (l') et l'état, 182[2].
ego et alter, 312[1].
égoïsme, 312[2], ii. 510.
égotiste (sentiment), ii. 508[2].
éject, 312[2].
élaboration, 313[1].
électriques (organes), 313[1].
électrobiologie, 313[2].
élément, 313[2].
élément affectif, 23[1], *454*[1].
élément de la conscience, 313[2].
élément hédonique, 453[2].
élémentaire (marginal), ii. 42[1].
éléments sensoriels et moteurs, ii. 520[1].
élimination, 313[2].
éloigné, ii. 463[2].
émanation, 314[1].
émancipation, 314[2].
émancipation intellectuelle, 326[2].
embryologie, 315[2].
embryon, 314[2].
éminent (domaine), 316[1].
emmétropie, 316[2].
émotif (délire), 57[2].
émotion, 316[2], *317*[1].
émotionnel (ton), 23[1].
émotionnelle (disposition), 317[2].
émotionnelle (expression), 317[2].
empiriocriticisme, 321[1].
empirique (logique), 318[2].
empirique (psychologie), ii. 389[1].
empirisme, 321[1].
emploi, ii. 744[1].
employeur, 321[2].
émulation, 321[2].
encéphale (cerveau), 126[1].
encyclopédie, 322[1].
Encyclopédistes, 322[1].
endoderme, 324[1], 491[1].
endothélium, 324[2].
énergie, 325[1].
énergie (conservation de l'), 218[2].
énergie spécifique des nerfs, ii. 567[2].
énergisme, 324[2].
enfance, 542[1].
enfant (psychologie de l'), 175[1].
enfants (jardin de petits), 601[1].
enfer, 465[2].
Engel (loi d'), 326[2].
enivrement, 565[2].
enlèvement, ii. 611[1].
ennui, **327**[1].
enseignement intuitif, ii. 192[2].
entendement et raison, ii. 725[2].
entérozoaires, 327[1].
enthousiastes, 327[1].
enthymème, 327[2].
entoptiques (phénomènes), 327[2].
entozoaires, 328[2].
entrepreneur, **328**[2], *328*[2].
envie, 578[1].
épagogique (syllogisme), 329[1].
ependyme, 324[2].
épiblaste, 329[1].
épichérème, 329[1].
Épicurisme, 329[1].
épidémie mentale, 330[1].
épidémique (folie), *387*[1].
épigenèse, 330[1].
épiglotte, 330[2].
épilepsie, 330[2].
épilepsie Jacksonienne, 577[1].
épilepsie larvée, *331*[2].
épileptique (folie), 387[2].
épinière (moelle), ii. 581[1].
Épiphanie, 333[1].
épiphénomène, 333[1].
épiphyse, 333[2].
épistémologie, 333[2].
épisyllogisme, 337[1].
épithélium, 337[1].
époques de culture, 248[2].
épreuve, ii. 355[2], 682[1].
équation personnelle, ii. 283[1].
équilibre, 100[1], 337[2], 338[1].
équilibre (sens de l'), 338[1].
équilibre (sensation d'), 338[1].
équilibre instable, ii. 743[2].
équipollence, 338[1].
équité, 338[2].
équivalent kinesthésique, 599[2].
équivalent mécanique, ii. 59[1].
équivoque, 338[2], 339[1].
Érastianisme, 339[1].
éréthisme, 339[2].
érotomanie, 340[1].
erreur, ii. 716[2].
erreur constante, 219[2].
erreurs (théorie des), 340[1].
eschatologie, 341[1].
escompte, 284[1].
ésotérique, 341[1].
espace, ii. 559[1].
espace (perception de l'), ii. 566[1].
espèce, ii. 566[2].
espèces (origine des), ii. 243[2].
espérance et désespoir, 485[2].
espérance messianique, ii. 71[1].
esprit, ii. 81[2], 82[1], 584[2], 818[2], ii. *681*[2].
Esprit (Âme *and*), ii. **681**[2].
esprit (dérangement d'), 271[1].
esprit (théorie de la composition de l'), 205[2].
esprit de corps, **341**[1], 217[1], *217*[1].
esprit (l') et le corps, ii. 82[2].
essence, 341[2].
Esséniens, 341[2].
esthésiogène, 19[2].
esthésiogénique, 19[2].
esthétique (l'), 20[1].
esthétique (absolutisme), 4[2].
esthétique (critérium), 245[2].
esthétique (instinct), 73[2].
esthétique (sentiment), ii. 521.
esthétique (sympathie), ii. 653[1].
esthétique algédonique, 33[1].

esthétique autoritative (règle), 21².
estimation à vue d'œil, ii. 801¹.
étage supérieur du pédoncule, ii. 663².
étalage de soi, ii. 510¹.
état, ii. 593, 601².
état (l') (et l'église), 182².
état (philosophie sociale de l'), ii. 594¹.
état agricole, 28¹.
état de conscience, ii. 598².
état de guerre, 113².
état de nature, ii. 599¹.
état fédéral, 377¹.
état final, 324².
état hypnotique, 490¹.
état inconscient, ii. 725¹.
état intermédiaire, 563².
état tétanique, ii. 687².
étendue, ii. 7², 503¹, ii. 411¹.
étendue de l'excitation, ii. 415¹.
éternel (temporel et), ii. 673².
éternelle (génération), 342¹.
éternelles (vérités), ii. *807*².
éternité, 342¹.
éternité de Dieu, 342².
éther, 342².
éthique, 346¹.
éthique intuitive, 569².
éthique théologique, ii. 692².
ethnographie, 348¹.
ethnologie, 348¹.
éthologie, 348².
étiologie, 21², 349¹.
étonnement, ii. 820².
étranger, 389².
être (l'), 109², ii. 420².
être (raison d'), ii. **414**².
êtres (les), ii. 424².
études formelles, 391².
étymologie, 349¹.
eucharistie, 349².
eudémonisme, 350¹.
Eusébiens, 351¹.
Eutychianisme, 351¹.
évangile, 417¹.
évangile primitif (hypothèse de l'), 291².
évanouissement, ii. 628¹.
évènement, 351¹.
évidence, 351².
évident, 351².
évocation, 353¹.
évolution, 353¹.
évolution (facteurs de l'), 368¹.
évolution mentale, 354².
évolution sociale, ii. 535².
exacte (logique), ii. 23².
exaltation, 355¹.
excellence, 355².
excentricité, 305¹.
excès, 355².
excès de l'offre (*or* de production), ii. 252¹.
excitabilité, 356¹.
excitant, ii. 603².
excitant normal, ii. 183¹.
excitation, 356¹, ii. 603².
excitation (étendue de l'), ii. 415¹.
excitation latente (période d'), 628².
exclus (tiers, milieu ou moyen), principe du, 356².
exclusion (méthode d'), 356².
excommunication, 357¹.
exécutif, 357¹.
exégèse, 357².
exemplaire, 235¹.
exercice, 357², ii. 681¹.
existence, ii. 421¹.
existence (jugement d'), 359¹.
exogamie, 359¹.
exorcisme, 359².
exotérique, 341¹.
expectation, 359².
expérience, 360², 362¹.
expérience d'Aristote, 68².
expérience de contrôle, 230¹, ii. 404¹.
expérience de Ferrier, 379¹.
expérience de Scheiner, ii. 490¹.
expérience intime de la liberté, 396¹.
expérimentale (psychologie), ii. 389¹, ii. *389*².
expérimentation, 362².
expiation, 85¹.
expiation vicariale, ii. 763¹.
explication, 362².
explicite, 525².
expression, 363¹.
expression émotionnelle, 317².
extase, 309¹, ii. 709².
extenseur (muscle), 386².
extension, 363², 364².
extension de (papier-)monnaie, 546¹.
extérieur (monde), connaissance du, 365².
extérieurs (objets), 365¹.
extériorisation des sensations, 304².
externalité, ii. 251².
extirpation, 366¹.
extrinsèque, 566¹.

faces (théorie de l'unité à deux), 295¹.
facial (angle), 367¹.
facilitation, 367².
facteur, 368¹.
facteurs de l'évolution, 368¹.
facteurs de la production, 368².
faculté, 369¹.
faculté d'acquisition, 11¹.
faculté morale, ii. 104¹.
facultés actives, 12².
faiblesse, 369¹.
faiblesse mentale, 377¹.
fait, 367².
fait (vérités de), *368*¹.
faits (vérités des), ii. *808*¹.
famille, 373².
fanatisme, 374¹.
fantaisie, 374¹.
fantastique, 374².
fantôme, 413², ii. 288¹.
fatigue, 374².
fausse (idée), 264².
fausseté, 373².
fausseté (vérité et), ii. 716².
faute, 247¹, 375², ii. 149¹.
faux, 373².
faux semblant, ii. 37¹.
Fechner (loi de), 376².
fécondation, 379².
fécondité, 379².
fédéral (état), 377¹.
feinte, ii. 37¹.
félicité, 378².
félicité (suprême), 422¹.
félicité universelle, ii. 741².
femelle, 378².
féminisme, 311¹.
Ferrier (expérience de), 379¹.
fertilité, 379².
fétiche, 380¹.
fétichisme, 380¹.
feu (culte de), 383².
feuillet moyen, ii. 70¹.
fiction légale, ii. 2¹.
fidéisme, 370².
fidélité de reproduction, 381².
fierté, ii. 339¹.
fièvre chaude, 396².
figure, 382¹.
figuré, 382¹.
figure du syllogisme, 382².
Fils de Dieu, ii. 556¹.
fin, 28¹, 323², ii. 678¹.
final, ii. 723².
final (état), 324².
finalité, 384².
finances, 383².
fini, 383².
fixation (point de), 386¹.
fixation des souvenirs, 386¹.
fixe (idée), 264², 386¹.
fixes (capitaux), 386¹.
fléchisseur (muscle), 386².
foi, 112², 369².
foi (analogie de la), 42².
foi (doctrine de la), ii. 301².
foi (guérison par la), ii. 85¹.
foi (règle de), ii. 482¹.
fol, 388¹.
folie, **387**¹, 550¹, ii. 32², 34².
folie à deux, *223*¹, *387*¹.
folie à double forme, 35¹.
folie circulaire, 35¹, *387*¹.
folie des antivivisectionnistes, ii. 26²¹.
folie des dégénérés, *260*².
folie des grandeurs, 387².
folie des ivrognes, 387².
folie du doute, 296², *387*¹, ii. 26²¹.
folie épidémique, *387*¹.
folie épileptique, 387².
folie morale, ii. 104¹.
folie paralytique, ii. *259*².
folie périodique, ii. 279².
folie simulée, 387².
fonction, 397².
fonction constructive ou créative, 221².
fonction du langage, 626¹.
fonction mentale, 397².
fondamental (son), 397², ii. 341¹.

fondamentale (couleur), 195[1].
fondamentale (vérité), 397[2].
fondement, 432[1].
fondement de relation, 398[1].
fondement du monde, ii. 822[1].
force, 388[2], ii. 604[2].
force centrifuge et centripète, 170[1].
force sociale, ii. 537[1].
force vive, ii. 801[2].
forces, ii. 604[2].
forces (composition des), 205[1].
forces (conservation des), 218[2].
forces (parallélogramme des), ii. 259[1].
forces bionomiques, 119[2].
formalisme, 390[2].
forme, 390[2].
forme (la matière et la), ii. 50[1].
forme synthétique, ii. **682**[1], ii. 678[2].
formelle (éducation), 392[1].
formelle (logique), 392[1].
formelles (études), 391[2].
formels (degrés), 393[2].
fortuit, 157[1].
fortune morale, **393**[2], ii. *106*[1], *320*[1], ii. 105[1].
fortune physique, **393**[2], ii. *106*[1].
fou, 241[2], 388[1], ii. 34[2].
foule, 246[2], ii. 89[1].
Fourier (loi de), 394[1].
fovea centralis, 394[1].
frais de production, 238[2].
frais non répartis, 579[2].
franchise, **394**[1].
Franciscains, 394[2].
fraternité, 394[2].
fraude, 395[1].
Fraunhofer (raies de), 395[1].
frein, ii. 469[2].
froid (point), 193[1], ii. 673[1].
fureur, 398[1].
fusion, 121[2], 398[1].

gain, 304[1].
gale (sensation de), 576[2].
Gallicanisme, 400[1].
gamogenèse, 404[2].
ganglion, 405[1].
ganglionnaire (cellule), 405[1].
ganglionnaire (plexus), 405[1].
garde mobile, ii. 682[1].
gastræa-théorie, 405[2].
gaucher, 277[1].
gemmule, 405[2].
générale (notion), 406[1].
générale (sensation), 199[2].
général (terme), 407[1].
général (bien), 407[1].
générale (vérité), ii. *739*[2].
générale (volonté), 407[1].
généralisation, 408[1].
génération, 408[1].
génération asexuée, 24[1].
génération éternelle, 342[1].
génération spontanée, ii. 587[2].
générations (alternance de), 35[1].
générique, 408[2].
générosité, 409[1].
genèse, 409[2], *409*[2].
génétique, 409[2].
génétique (méthode), 409[2].
génétique (psychologie), 410[1].
génétique (sélection), ii. 465[2].
génial, *410*[1].
génie, 410[1].
genou, 411[2].
genre, 405[2], 411[2], 600[1].
genre et degré, 601[1].
géographique (distribution), 289[1].
géométrie, 412[1].
gérant, 25[1].
germe, 412[1].
germinale (sélection), 412[1].
germinatif (plasma), 412[2].
germination, 412[2].
germinative (vésicule), 412[2].
gestation, 413[1].
gestes (langage de), 413[1].
glande, 414[2].
glande pinéale, 333[2].
gnose, 414[2].
gnosiologie, 414[2].
gnosticisme, 414[2].
gnostique, 414[2].
goût, ii. 662[1].
goût (sensations de), ii. 662[2].
gouvernement divin, 418[2].
grâce, 418[2], 419[1], ii. 69[1].
grâce suffisante, 311[1].
grade, 419[2].
grammaire, 419[2].
grand canthus, 153[2].
grand mal, *331*[2].
grand hypnotisme, *496*[2].
grande hystérie, *496*[2].
grandeur, ii. 36[2].
grandeur intensive, 559[2].
grandeurs (délire des), 420[1].
grandeurs (folie des), 387[2].
graphique (méthode), 420[1].
graphologie, 420[2].
gratitude, 421[1].
gravitation, 421[2].
gravité (centre de), 169[2].
gravité spécifique, ii. 567[2].
Grèce (écoles philosophiques de la), ii. 495[2].
Grèce (les Sept Sages de la), ii. 818[2].
grégaire (instinct), 430[2].
Gresham (loi de), 430[2].
grotesque, 431[2].
groupe, 432[1].
groupes (sélection des), 433[1].
guérison par la foi, ii. 85[1].
guerre, ii. 811[1].
guerre (l'état de), 113[2].
gustatives (sensations), ii. 662[2].

habitat, 436[1].
habitude, 435[1].
hagiologie, 437[1].
haine, 442[2].
hallucination, 437[2].
hallucination auditive, 9[2].
haptique, 441[1].
harmonie, 441[2].
harmonie préétablie, ii. 329[2].
harmonies économiques, 306[1].
harmonique, ii. 252[2].
harmoniques, 441[2].
hasard, 171[2].
hasard (jeu de), 403[1].
haut mal, 330[2], *332*[1].
hauteur du son, ii. 302[1].
hédonique (élément), 453[2].
hédonisme, 454[1].
hédonisme universaliste, ii. 742[1].
hellénistique, 466[1].
héméralopie, 467[1], ii. 177[1].
hémi-, 467[1].
hémianopsie, 467[1].
hémorragie, 468[1].
hénothéisme, 468[1].
Herbartianisme, 468[2].
hérédité, 471[1].
hérédité par l'usage, ii. 744[2].
hérésie, 474[2].
héritage, 546[2].
hermaphrodite, 475[1].
herméneutique, 475[1].
héros (culte des), 475[2].
hétérogamie, 476[1].
hétérogénéité, 483[2].
hétérogènes (sensations ou notions), 286[2].
hétérolécithe, 476[1].
hétéromorphose, 476[1].
hétéronomie, 476[1].
hétéro-psychologique (morale), 476[1].
heures de travail, 486[2].
heuristique (méthode), 476[2].
hibernal (sommeil), 476[2].
His (zones de), ii. 828[2].
histoire, 477[1].
histoire (philosophie (science) de l'), 477[2].
histoire (philosophie sociale de l'), ii. 594[1].
histoire de la philosophie, 480[1].
histoire naturelle, ii. 133[2].
holoblastique, 482[2].
homme, ii. 39[1], 41[1].
homogamie, 483[2].
homogénéité, 483[2].
homolécithe, 484[1].
homologues (organes), 484[1].
homonyme, 484[1].
homoousie, 484[2].
homotaxie, 484[2].
honnêteté, 484[2].
honneur, 484[2].
honte, ii. 525[2].
horde, 486[1].
horoptère, 486[1].
humaine (lèse-majesté), ii. 3[1].
humanisme, 486[2].
humanité, ii. 41[1].
humanité (religion de l'), ii. 462[1].
humeur, 488[1], ii. 103[2].
humeur (bonne), 488[1].
humiliation de Christ, 487[2].
humilité, 487[2].
hybride, 488[2].
hydrocéphalie, 488[2].

hylozoïsme, 489[1].
hyper-, 489[1].
hypergenèse, 489[2].
hypermétropie, 489[2].
hyperplasie, 489[2], *489*[2].
hypertrophie, 489[2], *489*[2].
hypnagogique, 489[2].
hypnogène, 490[1].
hypnose, 490[1].
hypnotique (état), 490[1].
hypnotisme, 490[2].
hypnotisme (grand), *496*[2].
hypo-, 491[1].
hypoblaste, 491[1].
hypocondrie, 491[1].
hypostatique (union), 492[1].
hypothèse, 492[1].
hypothèse de l'évangile primitif, 291[2].
hypothèse de la nébuleuse primitive, ii. 142[2].
hypothétique, 492[2].
hystérie, 494[1].
hystérie (grande), *496*[2].
hystérique (mutisme), *58*[2], 300[1].
hystéro-épilepsie, 496[2].

ictus, 60[1], ii. 604[2].
idant, **498**[1].
idéal, 499[1].
idéalisation, 504[1].
idéalisme, 500[2].
idéalité, 504[1].
idéal-réalisme, ii. 421[2].
idéation, 504[1].
idée, 498[1].
idée abstraite, 5[1].
idée composée, 204[2].
idée de Dieu, 415[1].
idée fausse ou fixe, 264[2].
idée fixe, 386[1].
idée-force, 499[1].
idées (association d'), 78[1].
idées délirantes de persécution, ii. 281[1].
idées innées, 548[2].
identiques (points) des rétines, 504[1].
identité (philosophie de l'), 506[2].
identité individuelle (perception de l'), 504[2].
identité matérielle (appréhension de l'), 505[2].
identité personnelle, ii. 283[2].
idéogramme, 507[1].
idéologie, 507[2].
idéo-moteur, 507[2].
idéoplasie, 507[2].
idéoplastique, 507[2].
idiopathique, 510[1].
idioplasme, 510[1].
idio-psychologique (morale), 510[1].
idiosyncrasie, 510[2].
idiotie, 50[1], 507[2].
idolâtrie, 511[1].
idole, 510[2].
ignorance, 511[1].
illusion, 264[2], 511[2].
illusion auditive, 9[2].
illusion des sens, ii. 517[2].
illusion volontaire, ii. 513[2].
illusions d'optique, ii. 206[1].
illusions du mouvement, 512[2].
illusions visuelles, ii. 206[1].
image, 516[1].
image composée, 408[2].
image consécutive, 23[2].
image de recouvrement, 213[1].
image kinesthésique, 599[2].
image motrice, 599[2].
image récurrente positive, ii. 433[1].
images (culte des), 516[2].
images de Purkinje, ii. 403[2].
images doubles, 296[1].
imagination (constructive), 517[1].
imago, **519**[1].
imbécillité, 50[1], 519[1].
imitation, 519[1].
imitation plastique, ii. 302[2].
immaculée (dogme de conception), 520[1].
immanence, 520[2].
immanence (philosophie de l'), 520[2].
immatérialisme, 521[1].
immédiat, 521[2].
immortalité, 523[2].
immortalité conditionnelle, 210[2].
immutabilité, 524[1].
imparfaites (obligations), ii. 111[1].
impénétrabilité, 524[1].
impensable (l'), ii. 743[2].
impératif catégorique, 160[1].
imperceptible, 525[1].
implication, 525[2].
implicite, 525[2].
impossibilité, ii. 313[1].
impôts (système d'), ii. 663[1].
impression, 526[1].
impressionisme, 526[2].
improductive (consommation), ii. 743[1].
impulsion, 527[1].
impulsions intellectuelles, 524[2].
impureté, ii. 32[2].
imputation, 527[2].
inapplicable, 575[1].
inattention, 528[2].
incapable, ii. 181[1].
incapacité, 2[1], 528.
incarnation, 528[2].
inclination, 529[1].
incohérence, 529[1].
incolorée (sensation), 146[2].
incompatibilité, ii. 466[1].
inconcevable (l'), ii. 743[2].
inconnaissable (l'), ii. 742[2].
inconscient, ii. 724[1].
inconscient (état), ii. 725[1].
inconscient (philosophie de l'), ii. 724[2].
inconsistance, 529[1].
incoordination, 529[2].
incrédulité, 242[2], ii. 724[1].
incrément, 530[1].
incroyable, 242[2].
indemnité, 530[1].
indépendance, 530[2].
indéterminisme, 530[2].
indice, 531[1].
indifférence, 337[2].
indifférence (point d'), 533[1].
indifférence (sentiment d'), 532[2].
indirecte (sélection), ii. 213[2].
indirecte (vision), 533[2].
indiscernables, 534[1].
individu, 534[1].
individualisme, 538[2], *193*[2].
individualiste, 539[1].
individualité, 539[1].
individuel, 534[1], ii. 533[1].
individuelle (perception de l'identité), 504[2].
individuelle (psychologie), 538[2].
individuelle (sélection), 538[2].
individus (sélection entre), 538[2].
induction, 539[1].
indulgence plénière, ii. 305[1].
industrialisme, 540[2], *540*[2].
industrie, 540[2].
industrie locale (spécialisation d'), ii. 20[2].
industriel, 540[2].
industriel (système), 540[2].
industrielle (organisation), ii. 219[1].
inébriété, 540[2].
inégale (sensation), ii. 480[1].
inertie, 541.
infaillibilité, 541[2].
inférence, 542[2].
inférence probable, ii. 353[2].
infidélité, 544[1].
infini, 544[1].
infinité, 545[2].
infinitésimal, 545[1].
infinitésimal (calcul), 150[1].
inflammation, 545[2].
inflexion, 546[1].
influence, 546[1].
influence naturelle (doctrine de l'), 168[1].
influence trophique, ii. 716[1].
influx physique (doctrine de l'), 168[1].
infralapsarisme, 546[1].
inhérence, 546[2].
inhibition, 547[2].
inhibition mentale, 546[2].
initiation, 548[2].
injustice, ii. 826[2].
inné, 214[2], 548[2].
innées (idées), 548[2].
innervation (sensation d'), 549[1].
innés (caractères), 10[1].
inquiétude, 57[1].
Inquisition, 549[2].
insectes, 553[2].
insomnie, 554[2], ii. 534[1].
inspiration, 555[1].
inspiration plénière, ii. 305[1].
instabilité, 555[1].
instable (équilibre), ii. 743[2].
instant, ii. 678[1].
instinct, 555[1].
instinct d'appropriation, 11[1].
instinct de jeu, ii. 304[1].

instinct esthétique, 73².
instinct grégaire, 430².
instinct religieux, ii. 462².
instinctive (moralité), 556¹.
instinctive (timidité), 102².
institution, 556².
instruction, 556².
instruments, 605¹.
intégral, 557².
intégration, 558¹.
intellect, 558².
intellectualisme, 559¹.
intellectuel (milieu), ii. 78².
intellectuelle (émancipation), 326².
intellectuelles (impulsions), 524².
intelligence, 558², ii. 185².
intelligible, ii. 178².
intensité, 559², ii. 802¹.
intensité d'éclairage (*or* lumineuse), 146².
intensive (grandeur), 559².
intention, 560¹, ii. 678².
interaction, 561².
intercession, 562¹.
intérêt, 562¹, 563¹.
intérêt personnel, ii. 510¹.
interférence, 563¹.
intérieure (parole) (et chant), 564¹.
intermédiaire (état), 563².
intermittence (son d'), 563².
international (droit), 564².
international (droit civil), 211².
international (droit) privé, 211².
interne, 564¹.
interne (observation), 567².
interne (sélection), 565².
interne (sensation), ii. 218¹.
interprétation, 564².
interprétation anagogique, 40¹.
intersubjectif, 565¹.
intervalle, 565¹.
intrinsèque, 566¹.
intrinsèque (valeur), 566¹.
introjection, 566¹.
introspection, 567².
introspective (méthode), 567².
intuitif (enseignement), ii. 192¹.
intuition, 568.
intuition morale, 568².
intuitionnisme, 570¹.
intuitionniste (morale ou éthique), 569².
intuitive (morale ou éthique), 569².
invagination, 570².
invention, 570².
invertébré, 573¹.
involontaire (action), 573².
involontaires (mouvements), 93¹.
involution, 574¹.
ironie, 574².
irradiation, 574².
irrationnelle (action), 575¹.
irréligion, 575².
irritabilité, 575².
irritant, 575².
Islam, ii. 95¹.
issue, 576².
ivresse, 297².
ivrognes (folie des), 387².

Jacksonienne (épilepsie), 577¹.
Jacksonienne (réévolution), 577¹.
jalousie, 578¹.
Jansénisme, 577².
jardin de petits enfants, 601¹.
Jaweh, 578¹.
Jéhovah, 578¹.
jésuitisme, 579¹.
Jésus, 579¹.
jeu, ii. 303².
jeu de hasard, 403¹.
jeu (instinct de), ii. 304².
joie, 580¹.
Judaïsme, 580¹.
judiciaire, 584¹.
jugement, 16², 532², 580², 583².
jugement (mettre quelqu'un en), 532².
jugement analytique et synthétique, 43².
jugement arbitral, 97².
jugement d'existence, 359¹.
jugement dernier, 584¹.
jugement moral, ii. 105¹.
jugement pratique, ii. 320¹.
jugement subordonné, ii. 726¹.
juridiction, 393², 584².
juridique, 584².
juridique (acte), 11².
jurisprudence, 584².
jurisprudence comparée, 201².
jurisprudence des tribunaux, 16².
juriste, 585¹.
juste milieu, ii. 56², ii. 57¹.
justice, 585¹, ii. 474², 475¹.
justice (propre), ii. 512².
justification, 587¹.

Kantianisme, 588¹.
kénose, 599¹.
kinésodique, 601².
kinesthésique (équivalent), 599².
kinesthésique (image), 599².
kinesthésique (sensation), 600¹.

laboratoire de psychologie, 605¹.
laid, ii. 723¹.
laissez-faire, **616**², 306¹, ii. 438².
lalo-, 616².
Lamarckisme, 617¹.
lamelle, 387².
langage, 618¹.
langage (fonction de), 626¹.
langage de gestes, 413¹.
langueur, 627².
larve, 628¹.
larvée (épilepsie), *331*².
lassitude, 628¹.
latence, 628¹.
latente (addition), ii. 620¹.
latente (chaleur), 628².
latente (période d'excitation), 628².
latitudinarisme, 639².
lécithe, 274².
leçons de choses, ii. 192¹.
lecture de la pensée, ii. 120¹.
légal, ii. 2¹.
légale (fiction), ii. 2¹.
légale (moralité), ii. 111¹.
légende, ii. 2¹.
législation, ii. 2².
légitimation, ii. 2².
légitime, ii. 2².
lemme, ii. 3¹.
lenteur, 300¹.
lèse-majesté, 476², ii. 3¹.
lèse-majesté divine, ii. 3¹.
lèse-majesté humaine, ii. 3¹.
lettre de change (une), 117¹.
lettres patentes, 175¹.
libéralisme, ii. 4¹.
liberté, 395¹, ii. 4¹.
liberté (sentiment *or* expérience intime de la), 396¹.
liberté économique, 305².
liberté religieuse, ii. 4¹.
libre, 395.
libre pensée, 326², 396².
libres penseurs, 396².
lien, ii. 176².
ligne de beauté, ii. 8¹.
ligne de direction, ii. 8¹.
ligne de regard, ii. 8¹.
ligne de visée, ii. 527¹.
ligne visuelle, ii. 801¹.
limitatif, ii. 6².
limite, ii. 7¹.
lisse (sensation de), ii. 480¹.
Listing (loi de) pour les mouvements de l'œil, ii. 8².
littérature orphique, ii. 250¹.
livres saints, ii. 484¹.
livres sibyllins (les), ii. 527¹.
locale (spécialisation d'industrie), ii. 20².
localisation des sensations auditives, ii. 20¹.
localisations cérébrales, ii. 15².
locaux (signes), ii. 15¹.
locomoteur, ii. 20².
locomotion, ii. 20².
logique, ii. 20², 27².
logique (algèbre de la), 640².
logique (analyse), 42².
logique (diagramme), ii. 28¹.
logique (machine), ii. 28².
logique des mathématiques, ii. 47¹.
logique des relations, ii. 447².
logique empirique, 318².
logique exacte, ii. 23².
logique formelle, 392¹.
logique matérielle, ii. 44².
logique sociale, ii. 537¹.
logique symbolique ou algorithmique, ii. 640².
logo-, ii. 30¹.
logomachie, ii. 30².
Logos, ii. 30².
loi, 11², 321², 639², 640¹, ii. 601².
loi (action de passer une), 321².
loi (projet de), 117¹.

loi biogénétique, 118[1].
loi constitutionnelle, 220[2].
loi d'association par contiguité, 224[1].
loi d'association par contraste, 228[2].
loi de Baer, 100[1].
loi de Donders, 295[1].
loi d'Engel, 326[2].
loi de Fechner, 376[2].
loi de Fourier, 394[1].
loi de Gresham, 430[2].
loi de la culture, 281[2].
loi d'orientation constante, ii. 243[2].
loi de récapitulation, ii. 428[2].
loi de relativité, ii. 450[2].
loi de Talbot-Plateau, ii. 661[1].
loi de Waller, ii. 810[2].
loi de Weber, ii. 812[1].
loi des débouchés, 529[2].
loi des mouvements des yeux, 295[1].
loi économique, 306[1].
loi morale, 641[1].
loi naturelle, ii. 133[2].
loi organique, 220[2].
loi phylogénétique, 118[1].
lois de la pensée, 641[1].
lois phonétiques, ii. 296[2].
loup-garou, ii. 813[2].
lucidité, 184[1], ii. 31[2].
lumière, ii. 768[2].
lumière (sensation de la), 146[2], ii. 781[1].
lumière naturelle, ii. 6[1].
lumière propre de la rétine, 510[1].
lumineuse, 146[2].
lumineuse (sensation), 146[2], ii. 6[1].
lustre, ii. 32[2].
Luthéranisme, ii. 33[1].
lutte des champs visuels, ii. 470[2].
lutte pour la vie, 358[1].
luxe, ii. 33[2].
lymphe, ii. 33[2].
lypémanie, ii. *61*[1].

machine logique, ii. 28[2].
macrocosme, ii. 34[1].
magie, ii. 35[1], 557[1].
magnétisme, ii. 36[2].
Mahométisme, ii. 95[1].
maîtrise de soi-même, ii. 509[1].
majeur, ii. 37[1].
mal, 352[2], ii. 826[2].
mal (grand), *331*[2].
mal (haut), 330[2], *332*[1].
mal (petit), 330[2], *331*[2], *332*[1].
maladie, 285[1].
maladie nerveuse, ii. 175[2].
mâle, ii. 37[2].
malice, ii. 37[2], 38[1].
Malthus (loi de), ii. 38[2].
mammifère, ii. 38[2].
mandant, ii. 341[2].
mandataire, 25[1].
Manichéisme, ii. 40[2].
manie, ii. 39[2].
manie aiguë, 396[2].
manie de la persécution, ii. 281[1].
manifestation, ii. 41[1].
marchander, 101[1].
marché, ii. 43[2].
marge de culture, ii. 41[2].
marginal (élémentaire), ii. 42[1].
mariage, ii. 43[2].
marine (la connaissance des affaires relatives à la), 17[1].
marque, ii. 43[1].
masse, ii. 44[1].
masse (centre de), 169[2].
matérialisme, ii. 45[1].
matérielle (identité), 505[2].
matérielle (logique), ii. 44[2].
mathématique (économie), ii. 47[1].
mathématiques, ii. 47[2].
mathématiques (logique des), ii. 47[1].
matière, 223[2], 390[2], ii. 49[1].
matière (la) et la forme, ii. 50[1].
matière mentale (théorie de la), ii. 86[1].
matriarcat, ii. 48[2].
mauvais œil, 353[1].
maxime, ii. 55[1].
maxime de droit, ii. 55[2].
mécanique, ii. 58[2], 59[1].
mécanique (équivalent), ii. 59[1].
mécanisme, ii. 59[2].
méchanceté, ii. 37[2], 38[1].
médiat, 521[2], ii. 59[2].
médiation, ii. 59[2].
médicale (psychologie), ii. 60[1].
méditation, 192[2], ii. 60[1].
méditer, 192[2].
médium, ii. 60[1].
méfait, ii. 38[1].
mégalomanie, 420[1], ii. 60[2].
mélancolie, ii. 61[1].
mélange, ii. 87[2].
mélange binoculaire des couleurs, 197[1].
mélange des couleurs, 196[2].
méliorisme, ii. 62[2].
même (le) et le différent, ii. 484[2].
mémoire, ii. 63[1].
mémoire organique, ii. 213[2].
Ménière (vertige de), *291*[1].
méninge, ii. 67[1].
méningite, ii. 67[1].
mensonge, ii. 4[2].
mental, ii. 376[1].
mental (composé), 205[2].
mental (développement), ii. 67[1].
mental (sentiment de l'effort), 311[2].
mental (processus), ii. 356[1].
mentale (aberration), 2[1].
mentale (activité), 13[2].
mentale (aliénation), *387*[1].
mentale (analyse), 43[1].
mentale (anomalie), 50[1].
mentale (cécité), 123[1].
mentale (confusion), 212[2].
mentale (contagion), 222[2].
mentale (défectuosité), 258[2].
mentale (épidémie), 330[1].
mentale (évolution *or* développement), 354[2].
mentale (faiblesse), 377[1].
mentale (fonction), 397[2].
mentale (inhibition), 546[2].
mentale (pathologie), ii. 267[2].
mentale (qualité), ii. 409[1].
mentale (restriction), 339[1].
mentale (surdité), 255[2].
mentale (synthèse), ii. 658[2].
mentale (théorie de la matière), ii. 86[1].
mentalité, ii. 68[2].
mentaux (types), ii. 721[2].
mercantile (système), ii. 68[2].
méridiens verticaux apparents (déviation des), 276[2].
mérite, 271[2], ii. 69[1].
méritoire, ii. 323[1].
mésenchyme, ii. 69[2].
mesmérisme, 490[2].
méso-, ii. 70[1].
mésoblaste, ii. 70[1].
mésoderme, ii. 70[1].
mésothélium, ii. 70[2].
messe, ii. 44[1].
messianique (espérance), ii. 71[1].
Messie, ii. 70[2].
mesure, ii. 57[1].
métabolisme, ii. 71[1].
métagenèse, ii. 71[2].
métamère, ii. 71[2].
métamériques (renflements) de la moelle, ii. 175[1].
métamorphopsie, ii. 71[2].
métamorphose, ii. 72[1].
métaphysique, ii. 72[2].
métayage, ii. 74[1].
métazoaire, ii. 74[1].
métempirique, ii. 74[2].
métempsycose, ii. 74[2].
méthode, ii. 75[1].
méthode (théorie de la), ii. 75[1].
méthode analytique, 45[1].
méthode de concordance, 27[2].
méthode d'exclusion, 356[2].
méthode des courbes, 420[1].
méthode des différences, 280[2].
méthode des différences à peine perceptibles, 280[2].
méthode des modifications minima, 280[2].
méthode des moindres carrés, 340[1].
méthode des résidus, ii. 467[2].
méthode économique, 306[2].
méthode génétique, 409[2].
méthode graphique, 420[1].
méthode heuristique, 476[2].
méthode introspective, 567[2].
méthode scientifique, ii. 500[2].
méthode socratique, ii. 548[2].
méthode Wallerienne, ii. 810[2].
méthodes de morale, ii. 76[1].
méthodes psychophysiques, ii. 392[1].
méthodique (sélection), 74[1].
méthodologie, ii. 75[1].
métis, 488[2].

métronymique, ii. 76[2].
mettre quelqu'un en jugement, 532[2].
Meyer (expérience de), ii. 77[1].
microcéphale, ii. 77[1].
microcosme, ii. 34[1].
micro-organisme, ii. 77[2].
migraine, ii. 77[2].
milieu, ii. **78**[2] ; 328[2], *328*[2].
milieu exclus (principe du), 356[2].
milieu intellectuel, ii. 78[2].
millénaire (règne), ii. 79[1].
millénium, 175[2].
millénium (doctrine du), ii. 79[1].
mimétisme, ii. 79.
mimique, ii. 81[2].
mineur, 542[2], ii. 37[1], 86[1].
minima (méthode des modifications), 280[2].
minimale (durée), 300[2].
miracle, ii. 86[2].
miroir (écriture en), ii. 86[2].
misologie, ii. 87[1].
misonéisme, ii. **682**[1].
mitose, ii. 87[1].
mnémotechnie, ii. 89[1].
mobile, ii. **682**[1] ; 21[2], ii. 113[1].
mobile (garde), ii. 682[1].
mobile (premier), ii. 682[1].
mobilité, ii. 89[1].
modalisme, ii. 89[1].
modalité, ii. 89[2].
mode, ii. 93[1], 103[2].
modèle, ii. 93[2].
modestie, ii. 93[2].
modification, ii. 94[1].
modifications minima (méthode des), 280[2].
moelle (renflements métamériques de la), ii. 175[1].
moelle épiniere, ii. 581[1].
mœurs, 349[1], *435*[2].
moi (le), ii. 507[2].
moi (sentiment du), ii. 508[2].
moi (unité du), ii. 68[1].
moi (le) et l'autre, 312[1].
moi primitif ou organique (sentiment du), 218[1].
moi tribal, ii. 715[1].
moindres carrés (méthode des), 340[1].
moment, ii. 98[1].
monade, ii. 98[1].
monde, ii. 118[1], 821[2].
monde (âme du), ii. 822[1].
monde (fondement du), ii. 822[1].
monde (principe du), ii. 822[1].
monde extérieur (connaissance du), 365[2].
monergisme, ii. 99[2].
monisme, ii. 99[2].
monnaie, 249[1], ii. 92[2].
monnaie (extension de), 546[1].
mono-, ii. 101[1].
monoidéisme, ii. 101[1].
monomanie, ii. 101[2].
monomanie du vol, 189[2].
monomanie raisonnante, ii. 101[2].
monophysites, ii. 102[1].
monopole, ii. 102[1].
monothéisme, ii. 102[1].
monothélisme, ii. 102[2].
monothélitisme, ii. 102[2].
monstre, ii. 103[1].
Montanisme, ii. 103[2].
moral, ii. 320[1].
moral (désordre), 286[1].
moral (jugement), ii. 105[1].
moral (ordre), ii. 212[1].
moral (progrès), ii. 105[2].
moral (sens), ii. 106[1].
morale, 346[1].
morale (action), 211[1].
morale (approbation), 63[2].
morale (conscience), 215[1].
morale (faculté), ii. 104[1].
morale (folie), 104[1].
morale (fortune), **393**[2], ii. *106*[1], *320*[1], ii. 105[1].
morale (intuition), 568[2].
morale (loi), 641[1].
morale (méthodes de), ii. 76[1].
morale (nature), ii. 141[2].
morale (obligation), ii. 194[1].
morale (statistique), ii. 106[2].
morale (théologie), ii. 110[2].
morale (théories de), 343[1].
morale hétéro-psychologique, 476[1].
morale idio-psychologique, 510[1].
morale intuitive (*or* intuitionniste), 569[2].
morale sociale, ii. 535[1].
morales (sciences), ii. 106[1].
moralité, ii. 111[1].
moralité instinctive, 556[1].
moralité légale, ii. 111[1].
morbide, ii. 111[2].
morphologie, ii. 111[2].
mort, 256[2].
mort spirituelle, 256[2].
mosaïque (théorie) de la vue, ii. 111[2].
moteur, ii. 113[2].
moteur (sentiment de l'effort), 311[2].
moteurs et sensoriels (éléments), ii. 520[1].
motif, ii. 113[1].
motif affectif, 21[2].
motif économique, 307[1].
motrice (aphasie), 58[1].
motrice (image), 599[2].
motrice (plaque), 324[2].
motrice (sensation), 600[1].
mouches volantes, ii. 118[2].
mouvement, ii. 111[2], 113[2], 116[1].
mouvement (illusions du), 512[2].
mouvement (quantité de), ii. 98[1].
mouvement (sensation de), 600[1].
mouvement de déglutition, ii. 626[1].
mouvement et repos, ii. 112[2].
mouvement péristaltique, ii. 280[2].
mouvement perpétuel, ii. 280[2].
mouvements associés, 217[2].
mouvements de l'œil, 366[1].
mouvements de l'œil (loi de Listing pour les), ii. 8[2].
mouvements des yeux (loi des), 295[1].
mouvements spontanés *or* involontaires, 93[1].
moyen (feuillet), ii. 70[1].
moyen (terme), ii. 77[2].
moyen exclus (principe du), 356[2].
moyenne, ii. 56[1].
moyens, ii. 57[1], 678[2].
Müller (cercle de), ii. 116[2].
multiple (l'un et le), ii. 201[1].
multiplicité, ii. 116[2], 306[2].
muscle, ii. 119[1].
muscle (temps perdu du), 628[2].
muscle extenseur, 386[2].
muscle fléchisseur, 386[2].
musculaire (sensation), ii. 121[1].
musculaire (tension), sensation de, ii. 604[1].
musicale (cécité), ii. 183[2].
musicale (surdité), ii. 705[2].
musique, ii. 121[2].
mutation, ii. 122[1].
mutisme, ii. 123[2].
mutisme hystérique, 58[2], 300[1].
mutisme psychique, 300[1].
mutité (surdi-), 254[1].
mutualité, ii. 124[1].
mutuel (échange), ii. 124[1], 429[2].
myélite, ii. 124[1].
myo-, ii. 124[1].
myopie, ii. 124[1], 142[2].
mystères, 65[2], ii. 124[2].
mysticisme, ii. 124[2].
mystique, ii. 124[2].
mythe, ii. 126[1].
mythique (théorie), ii. 126[2].
mythologie, ii. 126[2].

naïf, ii. 127[1].
nain, 301[2].
naissant, ii. 128[1].
naïve, ii. 127[1].
Napoléon (Code), 191[1], 226[1].
narcose, ii. 128[1].
narcotiques, ii. 128[1].
nationalité, ii. 128[2].
nations (richesse des), ii. 128[2].
nativisme, ii. 129[1].
nativité, ii. 132[2].
naturalisme, ii. 137[2].
naturalisme unitaire, ii. 726[2].
nature, ii. 138[2].
nature (contre), ii. 338[2].
nature (culte de la), ii. 142[2].
nature (état de), ii. 599[1].
nature (philosophie de la), ii. 142[1].
nature morale, ii. 141[2].
nature sensitive, ii. 519[1].
naturel, ii. 133[1].
naturel (réalisme), ii. 134[1].
naturelle (histoire), ii. 133[2].
naturelle (doctrine de l'influence), 168[1].
naturelle (loi), ii. 133[2].

naturelle (lumière), ii. 6[1].
naturelle (obligation), ii. 111[1].
naturelle (religion), ii. 134[1].
naturelle (sélection), ii. 134[1].
naturelle (théologie), ii. 137[2].
naturelles (obligations), ii. *111*[1].
naturels (droits), ii. 134[1].
naturisme, ii. 142[2].
Nazaréens, ii. 142[2].
néant, ii. 180[1].
nébuleuse primitive (hypothèse de la), ii. 142[2].
nécessaire, ii. 143[2].
nécessaire (le), ii. 143[1].
nécessaire (condition), ii. 143[1].
nécessitarisme, ii. 143[2].
nécessité, ii. 143[2].
nécessité (universelle), ii. 739[2].
négatif, ii. 148[1].
négation, ii. 146[1].
négation (délire de), ii. 61[2], 654[1].
négative (sélection), 313[2].
négative (sensation), ii. 149[1].
négative (variation), ii. 149[1].
négligence, ii. 149[1].
Némésis, ii. 149[2].
néo-, ii. 149[2].
néocriticisme, ii. 149[2].
Néo-Hégélianisme, ii. 149[2].
Néo-Kantisme, ii. 150[1].
Néo-Pitagoréisme, ii. 150[1].
Néo-Platonisme, ii. 150[1].
nerfs (énergie spécifique des), ii. 567[2].
nerfs vasomoteurs, ii. 759[2].
nerveuse (affection ou maladie), ii. 175[2].
nerveux (système), ii. 153[2].
nerveux périphérique (organe), 324[1].
nervosisme, ii. 166[2].
nervosité, ii. 166[2].
nescience, ii. 167[2].
Nestoriens, ii. 167[2].
net, ii. 167[2].
neurasthénie, ii. 168[2].
neurasthénique (dépression), 253[2].
neuroblaste, ii. 171[2].
neuroglia, ii. 172[1].
neurologie, ii. 172[1].
neurone, ii. 171[2], 175[1].
neutralité, ii. 176[1].
névralgie, ii. 168[1].
névraxe, ii. 171[1].
névrite, ii. 171[1].
névroblaste, 404[2].
névropathie, ii. 175[2].
névropore, ii. 175[2].
névrose, ii. 175[2].
nexus, ii. 176[2].
nidus, ii. 177[1].
nihilisme, ii. 177[2].
nirvana, ii. 178[1].
nisus, ii. 178[2].
noctambulisme, ii. 178[2].
nolition, ii. 179[1].
nom, ii. 127[1].
nombre, ii. 186[2].
nombre (concept (*or* idée) de), ii. 189[1].
nominal, ii. 179[2].
nominalisme, ii. 180[1].
nomologie, ii. 180[1].
non compos sui, ii. 181[1].
non-être, ii. 180[1].
non-moi, ii. 181[1].
non-volontaire, ii. 181[2].
noologie, ii. 181[2].
normal, ii. 182[2], 183[1].
normal (excitant), ii. 183[1].
normale (école), ii. 183[1].
normalité, ii. 182[1].
normatif, ii. 182[1].
norme, ii. 182[1], 481[2].
notale (cécité), ii. 183[2].
note, ii. 183[2].
notion, ii. 184[1].
notion de cause, 163[2].
notion générale, 406[1].
notion-limite, ii. 7[1].
notocorde, ii. 184[2].
noumène (-al), ii. 184[2].
nouvelle (la psychologie), ii. 391[1].
novation, ii. 186[1].
noyau, ii. 186[2].
numérique, ii. 190[1].
numérique (schème *or* diagramme), ii. 190[1].
nutritifs (échanges), ii. 71[1].
nutrition, ii. 190[2].
nyctalopie, 253[2].
nymphomanie, ii. 190[2].

obéissance, ii. 191[1].
objectif, ii. 191[1], 192[2].
objectif (droit), ii. 193[2].
objection, ii. 192[2].
objectivisme, ii. 194[1].
objet, ii. 191[1], 192[1].
objets extérieurs, 365[1].
obligation, 301[2], ii. 194[1].
obligation morale, ii. 194[1].
obligation naturelle, ii. 111[1].
obligations imparfaites, ii. 111[1].
obligations naturelles, ii. 111[1].
obscurantisme, ii. 198[1].
observation, ii. 198[1].
observation de soi, ii. 198[1].
observation interne, 567[2].
observations (calcul des), ii. 198[2].
obsession, 386[1], ii. 198[2].
obsessions, 524[2].
Occam (doctrine d'), ii. 199[1].
occasionalisme, ii. 199[1].
occasionnelles (hypothèse des causes), ii. 199[1].
occulte, ii. 199[2].
odeur, ii. 489[1].
odorat, ii. 200[2].
œcologie, ii. 200[1].
œil, ii. 769[2].
œil (axe de l'), ii. 206[1].
œil (coin de l'), 153[2].
œil (estimation à vue d'), ii. 801[1].
œil (mauvais), 353[1].
œil (mouvements de l'), 366[1].
œil (centre de rotation de l'), 170[1].
œil cyclopéen, 251[1].
œil pariétal, ii. 263[1].
œuf, ii. 252[2].
œuvres, ii. 821[2].
offre (excès de l'), ii. 252[1].
offre et demande, ii. 623[2].
olfactives (sensations), ii. 200[2].
omnipotence, ii. 200[2].
omniprésence, ii. 200[2].
omniscience, ii. 201[1].
onirologie, ii. 201[2].
oniromancie, ii. 201[2].
ontogenèse, ii. 202[1], ii. *202*[1].
ontogenèse (condensation de l'), ii. 526[2].
ontogénie, ii. 202[1].
ontologie, ii. 203[2].
ontologique (argument), ii. 202[2].
ontologisme, ii. 203[1].
ophélimité, 383[1], ii. 204[2].
ophthalmie, ii. 204[2].
opinion, ii. 204[2].
opposition, ii. 205[2].
opposition sociale, ii. 537[2].
optimisme et pessimisme, ii. 210[2].
optique, ii. 210[1].
optique (contraste spacial), 229[1].
optique (illusions d'), ii. 206[1].
optotypes, ii. 686[1].
or (règle d'), 416[1].
or (section d'), 416[1].
oracle, ii. 212[1].
ordonnance, ii. 212[2].
ordre, ii. 212[1].
ordre moral, ii. 212[1].
oreille, 443[1].
organe, ii. 212[2].
organe nerveux périphérique, 324[1].
organe pariétal, ii. 263[1].
organes analogues, 40[2].
organes des sens, ii. 517[2].
organes électriques, 313[1].
organes homologues, 484[1].
organes vocaux, ii. 802[2].
organique, ii. 5[1], 213[1].
organique (loi), 220[2].
organique (mémoire), ii. 213[2].
organique (sélection), ii. 213[2], ii. *217*[1].
organique (sentiment du moi), 218[1].
organisation, ii. 219[1].
organisation industrielle, ii. 219[1].
organisation sociale, ii. 537[2].
organisme, ii. 218[1].
organisme social, ii. 537[2].
organismes unicellulaires, ii. 726[1].
organon, ii. 219[1].
orgueil, ii. 339[1].
orientation, ii. 242[1].
orientation (renversement de l'), ii. 242[2].
orientation constante (loi d'), ii. 242[2].

orientée (variation), 273[1].
origine, 409[2], *409*[2].
origine de la vie, ii. 243[1].
origine des espèces, ii. 243[2].
originel, ii. 250[1].
originel (péché), ii. 250[1].
orphique (littérature), ii. 250[1].
orthodoxie, ii. 250[2].
orthogenèse, ii. 250[2].
orthoplasie, ii. 251[1].
oscillations de l'attention, 387[1].
oscillatoire (réaction) de la rétine, ii. 470[2].
otologie, ii. 251[2].
oubli, 390[2].
ouïe, 443[1].
ouïe (défauts de l'), 452[1].
ouvriers (syndicat d'), ii. 708[1].
ovule, ii. 252[2].
ovum, ii. 252[2].
oxy-, ii. 252[2].

paganisme, ii. 253[1].
païen, 453[1].
paix, ii. 274[2].
paléontologie, ii. 254[2].
palingenèse, ii. 254[2].
panenthéisme, ii. 255[1].
pangenèse, ii. 255[1].
panlogisme, ii. 255[2].
panmixie, ii. 255[2].
panpneumatisme, ii. 256[1].
panpsychisme, ii. 256[1].
panthéisme, ii. 256[2].
panthélisme, ii. 257[2].
Pape, ii. 309[2].
papier-monnaie (extension de), 546[1].
papillotement, 386[2].
para-, ii. 258[1].
parade, ii. 510[1].
paradoxe, ii. 258[1].
parallélisme psychophysique, ii. 258[1].
parallélogramme des forces, ii. 259[1].
paralogisme, ii. 259[1].
paralysie, 28[2], ii. 259[1].
paralytique (folie), ii. 259[2].
paranoia, ii. 261[1].
paraphasie, 6[2].
parasite, ii. 262[2].
parcimonie, ii. 264[1].
pardon, ii. 262[2].
parenté, 601[2].
parésie, 28[2], ii. 263[1].
paresthésie, 45[1].
parfait (accord), ii. 714[2].
pariétal, organe (ou œil), ii. 263[1].
parité, ii. 263[2].
parole (la), ii. 569[1], 821[1].
parole intérieure, 564[1].
parousie, ii. 263[2].
paroxysme, ii. 263[2].
parthénogenèse, ii. 264[1].
particulier, ii. 343[1].
partie, ii. 266[2].
partiel, ii. 265[2].
partiels (tons), ii. 265[2].
passé (temps), connaissance du, ii. 267[2].
passer une loi (action de), 321[2].
passif, ii. 266[2].
passion, ii. 266[2], 267[1].
pastorale (théologie), 60[2].
patellaire (réflexe), 602[1].
patentes (lettres), 175[1].
pathétique, ii. 268[1], ii. *268*[1].
pathologie mentale, ii. 267[2].
pathologique (psychologie), 2[2].
pathos, ii. 268[1], ii. *268*[1].
patriarcat, ii. 268[2].
patristique, ii. 274[1].
patristique (philosophie), ii. 268[2].
patron, 321[2].
patronymique, ii. 274[2].
pauvreté, ii. 318[2].
pays de droit écrit, ii. 744[1].
peau (sensation de la), 250[2], 271[1], ii. 533[1].
peccabilité, ii. 274[2].
péché, ii. 532[2].
péché originel, ii. 250[1].
péchés (rémission des), ii. 463[1].
pédagogie, ii. 275[1].
pédagogique (psychologie), ii. 275[1].
pédoncule, ii. 275[1].
pédoncule (étage supérieur du), ii. 663[2].
peine, 431[1], ii. 304[2], 397[1], 401[1].
peine et agrément, ii. 678[1].
peine et plaisir, 453[2].
peine (à) perceptible, 280[2].
peines (théorie des), ii. 276[1].
Pélagianisme, ii. 275[2].
Pénal (Code), 191[2].
penchant, 529[1].
pénible (et agréable), 453[2].
pénitence, ii. 276[1].
pensée, ii. 696[1].
pensée (lecture de la), ii. 120[1].
pensée (libre), 396[2].
pensée (lois de la), 641[1].
pensée (transmission de), ii. 696[2].
pensée discursive, 285[1].
pensée sélective (la), ii. 507[2].
penseurs (libres), 396[2].
Pentateuque, ii. 276[1].
perceptibles (différences à peine), 280[2].
perception, ii. 276[2].
perception de l'espace, ii. 566[1].
perception des couleurs (théorie de la), ii. 779[2].
perception visuelle de la profondeur (du relief, de la distance), 270[2].
perdition, ii. 278[1].
perfectibilité, ii. 278[2].
perfection, ii. 278[2].
perfectionnisme, ii. 278[2].
période d'excitation latente, 628[2].
périodicité, ii. 279[2].
périodique (folie), ii. 279[2].
périodique (vision), ii. 433[1].
Péripatéticiens, ii. 280[1].
périphérique (organe nerveux), 324[1].
péristaltique (mouvement), ii. 280[2].
permanence, ii. 280[2].
perpétuel (mouvement), ii. 280[2].
persécution (idées délirantes de), ii. 281[1].
persécution (manie de la), ii. 281[1].
perséité, ii. 281[1].
persévérance, ii. 282[1].
personnalité, ii. 282[2].
personnalité (altérations de la), ii. 284[2].
personnalité (troubles de la), ii. 284[2].
personne, ii. 282[2].
personnel, ii. 283[1].
personnel (intérêt), ii. 510[1].
personnel (sentiment), ii. 508[2].
personnelle (conservation), ii. 511[2].
personnelle (équation), ii. 283[1].
personnelle (identité), ii. 283[2].
personnelle (sélection), 538[2].
personnes (le Dieu en trois), ii. 715[2].
personnification, ii. 286[1].
perspicuité, ii. 287[1].
perte d'utilité, 289[2].
pertinent, ii. 287[1].
perturbation, ii. 287[1].
perversion, ii. 287[1].
pessimisme (optimisme *and*), ii. 210[2].
petit canthus, 153[2].
petit mal, 330[2], *331*[2], *332*[1].
peuples (psychologie des), 387[2].
peur, 375[2].
pharisaïsme, ii. 288[1].
phase, ii. 288[2].
phénomène, ii. 289[1].
phénomène de Purkinje, ii. 403[2].
phénomènes entoptiques, 327[2].
phénoménisme, ii. 288[2].
phénoménologie, ii. 288[2].
philanthropie, ii. 289[2].
philologie, ii. 289[2].
philosophème, ii. 290[1].
philosophie, ii. 290[2].
philosophie (histoire de la), 480[1].
philosophie de l'histoire, 477[2].
philosophie de l'identité, 506[2].
philosophie de l'immanence, 520[2].
philosophie de l'inconscient, ii. 724[2].
philosophie de la nature, ii. 142[1].
philosophie de la religion, ii. 454[1].
philosophie patristique, ii. 268[2].
philosophie présocratique, ii. 334[1].
philosophie scolastique, ii. 491[2].
philosophie sociale, ii. 538[2].
philosophie sociale (du droit, de l'histoire), ii. 594[1].

philosophie sociale de l'état, ii. 594[1].
philosophie socratique, ii. 549[1].
philosophie synthétique (la), ii. 659[1].
philosophiques (écoles) **de la Grèce**, ii. 495[2].
-phobie, ii. 296[1].
phonétique, ii. 296[2].
phonétiques (lois), ii. 296[2].
phoronomie, ii. 297[2].
photométrie, ii. 297[2].
phrénologie, ii. 298[2].
phylogénétique (loi), 118[1].
phylogénie, ii. 299[2].
physiocrates, ii. 300[1].
physiognomonie, ii. 300[1].
physiologie, ii. 300[2].
physiologique (psychologie), ii. 390[1].
physiologique (sélection), ii. 300[2].
physionomie, ii. 300[1].
physique (besoin), 62[1].
physique (fortune), **393**[2], ii. *106*[1].
physique (doctrine de l'influx), 168[1].
physique (science), ii. 300[1].
pied (clonus du), 49[2].
piétisme, ii. 301[2].
pinéal, ii. 263[1].
pinéale (glande), 333[2].
pitié, ii. 302[1].
pittoresque, ii. 301[1].
placement, 573[2].
plaisir, ii. 304[2].
plaisir (sensation de), ii. 678[1].
plaisir et douleur, ii. 253[1], 678[1].
plaisir et peine, 453[2].
plan, ii. 678[2].
planchette, ii. 302[2]; 612[2].
plante, ii. 302[2].
plaque motrice, 324[2].
plasme, ii. 302[2].
plasme germinatif, 412[2].
plasticité, ii. 302[2].
plastique (imitation), ii. 302[2].
plein (le), ii. 305[2].
plénière (indulgence), ii. 305[1].
plénière (inspiration), ii. 305[1].
plérôme, ii. 305[2].
plexus, ii. 305[2], 306[1].
plexus ganglionnaire, 405[1].
pluralisme, ii. 306[1].
pluralité, ii. 306[2].
pluralité (unité *and*), ii. 734[1].
pluralité des causes, ii. 306[2].
plus-value, ii. 625[2].
pneumatologie, ii. 308[1].
poids (sensation de), ii. 812[2].
poids spécifique, ii. 567[2].
point, ii. 308[1].
point cardinal, 155[1].
point chaud, 453[1], ii. 673[1].
point de fixation (*or* de regard), 386[1].
point d'indifférence, 533[1].
point de pression, ii. 337[1].
point de sensibilité thermique, ii. 673[1].
point froid, 193[1], ii. 673[1].
points correspondants, 237[2].
points de douleur, ii. 254[2].
points de recouvrement, 213[1].
points identiques des rétines, 504[1].
poisons (effets psychiques des), ii. 376[1].
poisons antagonistes, 50[2].
polémique, ii. 308[2].
politique, ii. 308[2], 309[1].
politique (économie), 307[1].
politique (science), ii. 309[1].
poly-, ii. 309[1].
ponctuelle (distance), ii. 308[1].
populace, ii. 89[1].
population, ii. 309[2].
Porphyre (arbre de), ii. 714[1].
portée, 526[1], ii. 503[1].
poser, ii. 310[2].
positif, ii. 311[2].
positif (droit), ii. 312[1].
position du corps (sensation de la), ii. 311[1].
position primaire, ii. 340[2].
positive (image récurrente), ii. 433[1].
positive (théologie), ii. 312[2].
positivisme, ii. 312[2].
possession (délire de), ii. 313[1].
possibilité, ii. 313[1].
possible, ii. 313[1].
postprédicament, ii. 315[2].
postulat, ii. 316[1].
potentialité, ii. 317[1].
potentiel, ii. 316[2].
pouls, ii. 397[1].
pouvoir, ii. 318[2].
pouvoir (sens de), ii. 319[2].
pragmatique, ii. 321[2].
pragmatisme, ii. 321[2].
pratique, ii. 320[1], 321[1].
pratique (jugement), ii. 320[1].
pratique (raison), ii. 320[2].
pratique (religion), ii. 321[1].
pratique (théologie), ii. 321[1].
précis, ii. 323[1].
précision, ii. 323[2].
précocité, ii. 324[1].
préconception, ii. 324[1].
prédestination, 390[1], ii. 325[1].
prédétermination, ii. 325[1], 331[2].
prédicable, ii. 325[1].
prédiction, ii. 329[1].
prédisposition, ii. 329[2].
préétablie (harmonie), ii. 329[2].
préexistence, ii. 330[1].
préformation, ii. 330[1].
préhension, ii. 330[2].
préhistorique (archéologie), 65[2].
premier, ii. 341[1].
premier mobile, ii. 682[1].
prémise, ii. *330*[2].
prémises (les choses), ii. *330*[2].
prémisse, ii. 330[2], ii. *330*[2].
prémonition, ii. 331[1].
préordination, ii. 331[2].
préparation, ii. 331[2], 681[1].
préperception, ii. 331[2].
prépondérance, ii. 331[2].
presbyopie, ii. 332[1].
presbytie, ii. 332[1].
prescience, 389[2].
prescription, ii. 332[1].
présent, ii. 333[1], 678[1].
présent (temps), ii. 333[1].
présentation, ii. 333[1].
présentationisme, ii. 333[2].
présocratique (philosophie), ii. 334[1].
présomption, ii. 337[2].
pressentiment, ii. 331[1].
pression (point de), ii. 337[1].
pression (sensation de), ii. 337[1].
présupposition, ii. 338[1].
prétérition, ii. 338[1].
prêtre, ii. 340[1].
preuve, ii. 359[1].
preuve (interne et externe), 352[1].
prévarication, ii. 338[2].
prière, ii. 323[1].
primaire, ii. 340[1].
primaire (position), ii. 340[2].
primaires et secondaires (caractères sexuels), ii. 524[1].
primates, ii. 340[2].
prime, 125[1], ii. 341[1], 612[1].
primitif, ii. 340[1].
primitif (hypothèse de l'évangile), 291[2].
primitif (sentiment du moi), 218[1].
primordial, ii. 340[1].
principal, ii. 341[2].
principal (débiteur), ii. 341[2].
principe, ii. 341[2].
principe de contradiction, 226[2].
principe de division, 398[1].
principe d'économie, 309[1].
principe de raison suffisante, ii. 616[1].
principe directeur, ii. 1[1].
principe du monde, ii. 822[1].
principe du tiers (milieu ou moyen) **exclus**, 356[2].
priorité, ii. 342[1].
privation, ii. 343[2].
privé, ii. 343[1].
privé (droit), ii. 343[2].
privé (droit international), 211[2].
privilège, ii. 343[2].
prix, ii. 338[2].
prix de revient, 360[2].
probabilisme, ii. 344[1].
probabilité, ii. 344[1].
probable (inférence), ii. 353[2].
problématique, ii. 355[2].
problème, ii. 355[2].
procédure, ii. 356[1].
procédure (loi de), 16[2].
procès, 12[1], 163[1], ii. 356[1].
processus, ii. 356[1].
processus psychique (*or* mental), ii. 356[1].
processus social, ii. 538[2].
procuration, 24[2].
prodromes, ii. 357[1].
production, ii. 357[1].
production (excès de), ii. 252[1].
production (facteurs de la), 368[2].

production (frais de), 238[2].
productivité, 311[1].
produit, ii. 471[1].
produit brut, 431[2].
profonde (connaissance), 554[1].
profondeur (perception visuelle de la), 270[2].
prognathisme, ii. 357[2].
progrès, ii. 358[1].
progrès moral, ii. 105[2].
progrès social, ii. 535[2].
progressif, ii. 358[1].
projection, ii. 358[2].
projet, ii. 358[2], 678[2].
projet de loi, 117[1].
prolifération, ii. 359[1].
propension, ii. 359[2].
prophétie, ii. 361[1].
propitiation, ii. 361[1].
proportion, ii. 361[1].
proposition, ii. 361[2].
proposition subalterne, ii. 726[1].
propre activité, ii. 508[2].
propre justice, ii. 512[2].
propre réalisation, ii. 512[2].
propriété, 191[2], ii. 359[2], 360[1]; 45[1].
prosodie, ii. 370[2].
prostration, ii. 370[2].
prosyllogisme, ii. 370[2].
protanopie, ii. 370[2].
protase, ii. 371[1].
protectionnisme, ii. 371[1].
protectrice (ressemblance), ii. 371[2].
protectrices (couleurs), ii. 811[2].
Protestantisme, ii. 372[2].
protiste, ii. 372[2].
protoplasme, ii. 372[2].
protozoaire, ii. 373[1].
providence, ii. 373[1].
provisoire, ii. 373[1].
prudence, ii. 374[1].
pseudesthésie, ii. 374[2].
pseudo-, ii. 374[2].
psyché, ii. 374[2].
psychiatrie, 33[1], ii. 375[2].
psychique, ii. 376[1].
psychique (cécité), 123[1], ii. 192[1].
psychique (croissance, développement), 433[1].
psychique (mutisme), 300[1].
psychique (processus), ii. 356[1].
psychique (surdité), 255[2].
psychique (synthèse), ii. 658[2].
psychiques (effets) des poisons, ii. 376[1].
psycho-, ii. 382[1].
psychogenèse, ii. 382[1].
psychogénique, ii. 382[2].
psychologie, ii. 382[2].
psychologie (laboratoire de), 605[1].
psychologie animale, 48[1].
psychologie biblique, 116[1].
psychologie comparée, 201[2].
psychologie de l'enfant, 175[1].
psychologie des anormaux, 2[2].
psychologie des peuples, 387[2].
psychologie des races, ii. 414[1].
psychologie empirique, rationnelle, ii. 389[1].
psychologie expérimentale, ii. 389[1], ii. 389[2].
psychologie génétique, 410[1].
psychologie individuelle, 538[2].
psychologie médicale, ii. 60[1].
psychologie nouvelle (la), ii. 391[1].
psychologie pathologique, 2[2].
psychologie pédagogique, ii. 275[1].
psychologie physiologique, ii. 390[1].
psychologie sociale, ii. 538[2].
psychologie variationnelle, ii. 759[1].
psychologique, ii. 376[1].
psychologique (analyse), 43[2].
psychologique (automatisme), 95[1].
psychologisme, ii. 382[2].
psychologues (sophisme des), ii. 382[2].
psychométrie, ii. 391[1].
psychomoteur, ii. 391[2].
psychonomique, ii. 391[2].
psychopathologie, ii. 391[2].
psychophysique, ii. 392[2].
psychophysique (parallélisme), ii. 258[1].
psychophysiques (méthodes), ii. 392[1].
psychose, ii. 392[2].
psychoses du développement, 275[1].
psychothérapie, ii. 394[2].
Ptolémée (système de), ii. 396[1].
puberté, ii. 396[1].
public, ii. 396[1].
public (droit), 220[2], ii. 396[2].
publique (système d'assistance), ii. 309[2].
pudeur, ii. 525[2].
puissance, ii. 117[1], 318[2], ii. 319[1].
punition, ii. 397[1], 401[1].
pupe, ii. 401[2].
pur, ii. 401[2].
pureté, ii. 403[1].
purgatoire, ii. 402[2].
Puritanisme, ii. 403[1].
Purkinje (images de), ii. 403[2].
Purkinje (phénomène de), ii. 403[2].
Pyrrhonisme, ii. 404[2].

qualité, ii. 406[1].
qualité mentale, ii. 409[1].
quantité, ii. 409[2].
quantité de mouvement, ii. 98[1].
quelque chose surajoutée, 333[1].
quelques, ii. 555[2].
qui donne le bonheur, 378[2].
quiddité, ii. 412[2].
quiétisme, ii. 412[2].

rabbinisme, ii. 413[1].
race, ii. 413[2].
races (psychologie des), ii. 414[1].
racine, ii. 414[2], 479[2].
radiations, ii. 414[2].
rage, ii. 413[1].
raies de Fraunhofer, 395[1].
raison, 432[1], ii. 424[2], 425[2], ii. 726[1].
raison (entendement et), ii. 725[2].
raison d'être, ii. **414**[2]; 500[2].
raison pratique, ii. 320[2].
raison suffisante, ii. *616*[1].
raison suffisante (principe de), ii. 616[1].
raisonnable, ii. 426[1].
raisonnante (monomanie), ii. 101[2].
raisonnement, ii. 426[1].
raisonnement (vérités de), *368*[1].
rajeunissement, ii. 439[2].
rang, 419[2].
rappel, ii. 472[2].
rappeler (se), ii. 463[1].
rapport, ii. **415**[1], ii. 439[2]; 490[1].
rapport à (sans), 573[1].
rationalisme, ii. 415[2].
rationnel, ii. 415[1].
rationnelle (psychologie), ii. 389[1].
rayon de direction, ii. 417[1].
rayon visuel, ii. 8[1].
rayonnante (couronne), ii. 414[2].
réactif, ii. 420[1].
réaction, ii. 417[1].
réaction (action et), 12[2].
réaction (temps de), ii. 417[1].
réaction anticipée, 56[1].
réaction catholique, 162[2].
réaction oscillatoire de la rétine, ii. 470[2].
réal-idéalisme, ii. 421[2].
réalisation (propre), ii. 512[2].
realisme, ii. 421[2].
réalisme naturel, ii. 134[1].
réalité, ii. 420[2].
réalité (sans), ii. 743[2].
réalité (sentiment de), ii. 424[2].
récapitulation (loi de), ii. 428[2].
réceptivité, ii. 429[2].
réciprocité, ii. 429[2].
réciproque (demande), ii. 429[2].
récognitifs (signes), ii. 432[2].
récognition, ii. 430[1].
récompense, ii. 472[2].
reconnaissance, 421[1], ii. 430[1].
recouvrement, ii. 433[1].
recouvrement (image de; points de), 213[1].
rectitude, ii. 433[1].
récurrent, ii. 433[1].
récurrente positive (image), ii. 433[1].
Rédempteur, ii. 434[1].
réduction, ii. 434[2].
réductionnelle (division), ii. 435[2].
réel, ii. 420[1].
réels, ii. 424[2].
réévolution Jacksonienne, 577[1].
réfléchi, ii. 436[1].
réflectif, ii. 436[1].
réflexe (action), ii. 436[2].
réflexe conscient, ii. 436[1].

réflexe de déglutition, ii. 626[1].
réflexe patellaire, 602[1].
réflexion, ii. 435[2], 436[1].
Réformation, ii 437[2].
réfraction, ii. 437[2].
réfutation, ii. 437[2].
regard (angle ascensionnel du), 47[1].
regard (champ de), 381[2].
regard (ligne de), ii. 8[1].
regard (point de), 386[1].
régénération, ii. 437[2].
règle, ii. 481[1].
règle de foi, ii. 482[1].
règle d'or, 416[1].
règle esthétique autoritative, 21[2].
règne millénaire, ii. 79[1].
regret, ii. 438[2].
régulier, ii. 439[1].
relatif, ii. 443[2].
relation, ii. 439[2].
relation (fondement de), 398[1].
relations (logique des), ii. 447[2].
relativité, ii. 450[1].
relativité (loi de), 450[2].
relativité de la connaissance, ii. 450[2].
relief (perception visuelle du), 270[2].
religieuse (conscience), ii. 462[2].
religieuse (liberté), ii. 4[1].
religieux (instinct), ii. 462[2].
religion, ii. 452[1].
religion (philosophie de la), ii. 454[1].
religion de l'humanité, ii. 462[1].
religion naturelle, ii. 134[1].
religion pratique, ii. 321[1].
religion védique, ii. 760[1].
religions comparées (science des), 201[2].
réminiscence, ii. 463[1].
rémission (des péchés), ii. 463[1].
Remontrants, ii. 463[1].
remords, ii. 463[1].
Renaissance, ii. 463[2].
renflements métamériques de la moelle, ii. 175[1].
rente, ii. 463[2].
renversement de l'orientation, ii. 242[2].
répartis (frais non), 579[2].
repentance, ii. 464[1].
repos, ii. 464[1], 469[2].
repos (mouvement et), ii. 112[2].
représentation, 518[1], ii. 464[2].
représentationisme, ii. 464[2].
représentent, ii. 679[2].
représenter, ii. 464[2].
réprobation, ii. 465[1].
reproduction, ii. 465[2].
reproduction (fidélité de), 381[2].
reproduction sexuelle, 404[2], ii. 525[1].
reproduction volontaire, ii. 432[2].
répugnance, ii. 466[1].
répulsion (attraction et), 89[2].
réseau, ii. 306[1].
résidu, ii. 707[2].
résidus (méthode des), ii. 467[2].
résignation, ii. 468[1].
résistance, ii. 468[1].
résistance (sensation de), ii. 468[1].
résolution, ii. 468[2].
respect, ii. 468[2], 472[1].
responsabilité, ii. 3[2], 468[2].
responsable, 9[1].
ressemblance, ii. 6[1].
ressemblance protectrice, ii. 371[2].
ressentiment, ii. 467[2].
ressort, 393[2].
restriction mentale, 339[1].
résultant (son), 104[1], ii. 470[1].
résultante, ii. 470[1].
résultat, ii. 470[1].
résurrection, ii. 470[1].
rétablissement universel, 59[2].
rétention, ii. 470[2].
rétine, ii. 470[2].
rétine (lumière propre de la), 510[1].
rétine (réaction oscillatoire de la), ii. 470[2].
rétines (points identiques des), 504[1].
retour au type, ii. 438[1].
rétribution, ii. 471[1], 472[2].
rétrogression sociale, ii. 538[2].
rêve, 297[1].
réveil, ii. 472[2].
révélation, ii. 471[2].
révérence, ii. 472[1].
rêverie, ii. 472[1].
réversion, ii. 472[1].
revient (prix de), 360[2].
rhétorique, ii. 473[1].
rhythme, ii. 473[1].
richesse, ii. 811[2].
richesse des nations, ii. 128[2].
'rien n'est beau que le vrai,' *70*[2], *106*[1].
rien ne se fait sans raison suffisante, ii. *616*[1].
rigidité, ii. 475[1].
rigoristes (-isme), ii. 475[1].
Ritschl (doctrine de), ii. 475[2].
Ritschlianisme, ii. 475[2].
rituel, ii. 476[1].
rivalité, ii. 476[1].
roi-philosophe, ii. 290[1].
romain (droit), ii. 478[1].
romaine (Église catholique), ii. 478[2].
Romanisme, ii. 478[2].
romantique, ii. 479[1].
rotation de l'œil (centre de), 170[1].
rotation (sensation de), ii. 480[1].
rotulien, 602[1].
rougeur, 123[2].
rude (sensation), ii. 480[1].
rudesse du son, 442[2].
rudiment, 49[2], ii. 481[1].
rugueux (sensation de), ii. 480[1].
ruine, ii. 481[1].

sabbatisme, ii. 483[1].
Sabellianisme, ii. 483[1].
saccade, ii. 484[2].
sacerdotalisme, ii. 483[2].
sacrement, ii. 483[2].
sacrifice, ii. 484[1].
sacrifice de soi-même, ii. 509[1].
saducéisme, ii. 484[1].
Sages de la Grèce (les Sept), ii. 818[2].
sagesse, ii. 818[1].
sain, ii. 487[2].
sainte cène, 349[2].
Saint-Esprit, 482[2].
Saint-Guy (danse de), 176[2].
sainteté (de Dieu), 482[2].
salaire, 304[1], ii. 810[1].
salle des crises, 245[2].
saltatoire (chorée), 252[2].
salut, ii. 484[2].
sanctification, ii. 485[1].
sanction, ii. 485[2].
sang, 123[2].
sang froid (animaux à), 193[1].
sanguin, ii. 487[1].
sans rapport à, 575[1].
sans réalité, ii. 743[2].
santé, ii. 487[2].
Satan, ii. 487[2].
satisfaction, ii. 487[2].
saturation, ii. 488[1].
saut, ii. 484[2].
sauvage, ii. 488[1], 815[2].
Sauveur, ii. 488[2].
saveurs, ii. 662[2].
savoir, 206[1].
scepticisme, ii. 489[1].
Scheiner (expérience de), ii. 490[1].
schématisme, ii. 490[2].
schème, ii. 490[2].
schème numérique, ii. 190[1].
schisme, ii. 491[2].
Schopenhauerisme, ii. 499[1].
science, ii. 499[1].
science de l'histoire, 477[2].
science des religions comparées, 201[2].
science physique, ii. 300[1].
science politique, ii. 309[1].
science sociale, ii. 595[2].
sciences morales, ii. 106[1].
sciences sociales, ii. 539[2].
scientifique (méthode), ii. 500[2].
scissiparité, 384[1].
scissure, 384[2].
sclérose, ii. 503[1].
scolastique, ii. 491[2].
scolastique (philosophie), ii. 491[2].
scolastique (théologie), ii. 495[2].
Scotisme, ii. 503[2].
scrupule, ii. 503[2].
secondaires (caractères sexuels primaires et), ii. 524[1].
sécrétion, ii. 504[1].
secte, ii. 504[1].
section d'or, 416[1].
segmentation, 189[1], ii. 504[2].
ségrégation, 576[1].
sélection, ii. 504[2], 506[2].
sélection artificielle (*or* méthodique), 74[1].

sélection des groupes, 433[1].
sélection entre individus, 538[2].
sélection et suppression sociales, ii. 540[1].
sélection génétique, ii. 465[2].
sélection germinale, 412[1].
sélection individuelle, 538[2].
sélection interne, 565[2].
sélection naturelle, ii. 134[1].
sélection négative, 313[2].
sélection organique, ii. 217[1].
sélection organique *or* indirecte, ii. 213[2].
sélection personnelle, 538[2].
sélection physiologique, ii. 300[2].
sélection sexuelle, ii. 525[1].
sélective (la pensée), ii. 507[2].
sémantique, ii. 513[1].
semblable, ii. 530[2].
semblant, ii. 513[1].
semblant (faux), ii. 37[1].
semi-pélagianisme, ii. 514[2].
sénescence, ii. 514[2].
sens, ii. 57[1], 515[2].
sens (illusion des), ii. 517[2].
sens (organes des), ii. 517[2].
sens commun, 200[1].
sens de l'équilibre, 338[1].
sens de pouvoir, ii. 319[2].
sens du corps, 199[2].
sens du temps, ii. 705[1].
sens moral, ii. 106[1].
sens spirituel, ii. 517[1].
sensation, ii. 515[2].
sensation (cercle de), ii. 519[2].
sensation anormale de couleur, 181[2].
sensation articulaire, 73[2], 580[1].
sensation associée, 209[1].
sensation auditive, 451[1].
sensation consécutive, 24[1].
sensation cutanée, 250[2], 271[1], ii. 533[1].
sensation de contact, 222[2].
sensation de couleur, 197[1].
sensation de douleur, ii. 254[1].
sensation de douleur et de plaisir, ii. 678[1].
sensation d'équilibre, 338[1].
sensation de gale, 576[2].
sensation d'innervation, 549[1].
sensation de la lumière, 146[2], ii. 781[1].
sensation de la peau, 250[2], 271[1], ii. 533[1].
sensation de la position du corps, ii. 311[1].
sensation de lisse, ii. 480[1].
sensation de mouvement, 600[1].
sensation de poids, ii. 812[2].
sensation de pression, ii. 337[1].
sensation de résistance, ii. 468[1].
sensation de rotation, ii. 480[1].
sensation de rude, inégal *and* égal, ii. 480[1].
sensation de rugueux, ii. 480[1].
sensation de température, ii. 673[1].
sensation de tension musculaire, ii. 604[1].
sensation de traction, ii. 397[1].
sensation des tendons, ii. 604[1].
sensation générale, 199[2].
sensation interne, ii. 218[1].
sensation kinesthésique (*or* motrice), 600[1].
sensation lumineuse, ii. 6[1].
sensation lumineuse (incolorée *or* achromatique), 146[2].
sensation musculaire, ii. 121[1].
sensation négative, ii. 149[1].
sensation sexuelle, ii. 525[2].
sensation statique, ii. 600[2].
sensation tactile (*or* de tact), ii. 707[1].
sensation thermique, ii. 673[1].
sensation unie, ii. 480[1].
sensation visuelle, ii. 781[1].
sensationisme, ii. 515[2].
sensations (extériorisation des), 304[2].
sensations de goût, ii. 662[2].
sensations des couleurs, 146[2].
sensations des tendons, ii. 674[2].
sensations gustatives, ii. 662[2].
sensations olfactives, ii. 200[2].
sensations ou notions hétérogènes, 286[2].
sensations subjectives, ii. 610[2].
sensibilité, 19[2], 21[2], ii. 517[2], 519[1].
sensibilité (théorie de la), 453[2].
sensibilité (troubles de la), ii. 517[2].
sensibilité aux différences, ii. 517[1].
sensibilité thermique (point de), ii. 673[1].
sensitive (nature), i. 519[1].
sensorielle (aphasie), 58[1].
sensoriels et moteurs (éléments), ii. 520[1].
sensori-moteur, ii. 519[2].
sensorium, ii. 519[2].
sensualisme, ii. 515[2], 520[1].
sensuel, ii. 520[2].
sentiment, 377[1].
sentiment de différence, 280[1].
sentiment d'indifférence, 532[2].
sentiment de l'avenir, 399[2].
sentiment de la congruence (*or* d'accord), 384[2].
sentiment de l'effort mental, 311[2].
sentiment de l'effort moteur, 311[2].
sentiment de la liberté, 396[1].
sentiment de réalité, ii. 424[2].
sentiment du moi, ii. 508[2].
sentiment du moi primitif ou organique, 218[1].
sentiment égotiste ou personnel, ii. 508[2].
sentiment esthétique, ii. 521.
sentiment sexuel, ii. 525[1].
Sept Sages (de la Grèce), les, ii. 818[2].
Septante (version des), ii. 521[2].
série, ii. 521[2].
services économiques, ii. 522[1].
servitude, ii. 522[1], 523[1].
seuil, ii. 696[2].
sexe, ii. 523[2].
sexuel (sentiment), ii. 525[1].
sexuelle (reproduction), 404[2], ii. 525[1].
sexuelle (sélection), ii. 525[1].
sexuelle (sensation), ii. 525[2].
sexuels (caractères) primaires et secondaires, ii. 524[1].
shock, ii. 526[1].
Shyytes (Sunnites et), ii. 621[1].
sibyllins (les livres), ii. 527[1].
signe, ii. 527[2].
signe de dièse (de bémol ; de bécarre), 181[1].
signe temporal, ii. 673[2].
signes locaux, ii. 15[1].
signes récognitifs, ii. 432[2].
signification, 526[1], ii. 528[1].
significations (théorie des), ii. 529[1].
similitude, 27[2].
similitude (conscience de), 217[1].
simple, ii. 531[1].
simplicité, ii. 532[1].
simulation, ii. 532[1].
simulée (folie), 387[2].
simultané (contraste) des couleurs, 228[1].
sincérité, ii. 532[2].
singularisme, ii. 533[1].
singulier, ii. 533[1].
sociabilité, ii. 543[1].
sociabilité (croissance de), ii. 543[1].
social (contrat), ii. 534[2].
social (organisme), ii. 537[2].
social (processus), ii. 538[2].
social (progrès), ii. 535[2].
social (tissu), ii. 541[1].
sociale (classe), 185[1].
sociale (conscience), ii. 534[1], 715[1].
sociale (contagion), 222[2].
sociale (décadence), ii. 538[2].
sociale (dynamique), ii. 534[2].
sociale (évolution), ii. 535[2].
sociale (force), ii. 537[1].
sociale (logique), ii. 537[1].
sociale (morale), ii. 535[1].
sociale (opposition), ii. 537[2].
sociale (organisation), ii. 537[2].
sociale (philosophie), ii. 538[2].
sociale (philosophie) de l'état, du droit, de l'histoire, ii. 594[1].
sociale (psychologie), ii. 538[2].
sociale (rétrogression), ii. 538[2].
sociale (science), ii. 595[2].
sociale (statique), ii. 540[1].
sociale (unité), ii. 541[1].
sociales (sciences), ii. 539[2].
sociales (sélection et suppression), ii. 540[1].
socialisation, ii. 543[1].
socialisme, ii. 541[2].
Socialistes en chaire, ii. 542[1].
société, ii. 543[2] ; 201[1].
société anonyme, 235[2].
Sociniens, ii. 544[1].

sociologie, ii. 544[1], *544*[1].
socionomique, ii. 548[2].
socius, ii. 548[2].
socratique (méthode), ii. 548[2].
socratique (philosophie), ii. 549[1].
soi (l'amour de), ii. 510[2].
soi (connaissance de), ii. 510[2].
soi (étalage de), ii. 510[1].
soi (observation de), ii. 198[1].
soi-même, ii. 507[2].
soi-même (conscience de), ii. 509[1].
soi-même (détermination par), ii. 509[2].
soi-même (maîtrise de), ii. 509[1].
soi-même (sacrifice de), ii. 509[1].
solidarité, ii. 553[1].
solipsisme, ii. 553[1].
solution, ii. 554[2].
soma, ii. 554[2].
somatologie, ii. 555[1].
somatopleure, ii. 555[1].
sommation, ii. 620[1].
sommeil, ii. 533[1], 709[2].
sommeil hibernal, 476[2].
sommet, ii. 762[1].
Sommistes, ii. 620[2].
somnambule, ii. 177[2].
somnambulisme, ii. 555[2].
son, 184[2], 205[2], 449[2], ii. 122[1], 183[2], 705[2].
son (couleur du), 195[1].
son (hauteur du), ii. 302[1].
son (rudesse du), 442[2].
son additionnel, ii. 620[2].
son (ton) d'intermittence, 563[2].
son différentiel, 281[1].
son fondamental, 397[2], ii. 341[1].
son résultant, 104[1], ii. 470[1].
sons (accord de trois), ii. 714[2].
sophisme, 372[2], ii. 556[1].
sophisme des psychologues, ii. 382[2].
Sophistes, ii. 556[2].
sophistique, ii. 556[2].
sorcellerie, ii. 557[1], 818[2].
sorite, 171[2], ii. 557[1].
sotériologie, ii. 557[1].
souffrance, ii. 616[1].
Soufisme, ii. 617[2].
sourd (un), 254[2].
souvenir (se) de, ii. 463[1].
souvenirs (fixation des), 386[1].
souverain bien, 477[1].
souveraineté, ii. 558[1].
souveraineté de Dieu, ii. 558[2].
spacial (contraste) optique, 229[1].
spacialisation, ii. 566[1].
spasme, 190[1], ii. 556[2].
spécialisation (d'industrie) locale, ii. 20[2].
spécification, ii. 567[2].
spécifique (gravité), ii. 567[2].
spécifique (poids), ii. 567[2].
spécifique (énergie) des nerfs, ii. 567[2].
spectre, 413[2], ii. 568[1].
spéculation, ii. 568[2].
spermatique (cellule), ii. 580[2].
spermatiste, 48[2].
spermatogenèse, ii. 580[2].
sperme, ii. 580[2].
sphère attractive, 170[2].
Spinozisme, ii. 584[2].
spiritisme, ii. 585[2].
spiritualiste (théorie), ii. 557[2].
spiritualité, ii. 587[1].
spirituel (sens), ii. 517[1].
spirituel et charnel, ii. 587[1].
spirituelle (la vie), ii. 6[1].
spirituelle (mort), 256[2].
spiromètre, ii. 587[1].
splanchnopleure, ii. 587[1].
spongioblaste, ii. 587[2].
spontanée (génération), ii. 587[2].
spontanée (timidité), 102[2].
spontanéité, ii. 587[2].
spontanés (mouvements), 93[1].
spore, ii. 588[1].
stabilité, ii. 592[2].
statique, ii. 601[1].
statique (économie), ii. 600[1].
statique (sensation), ii. 600[2].
statique sociale, ii. 540[1].
statistique, ii. 601[1].
statistique morale, ii. 106[2].
statut, ii. 601[2].
stéréoscopique (vision), 602[1].
stérilité, ii. 602[2].
sthénique, ii. 603[1].
stigmate, ii. 603[1].
stimulant, 575[2], ii. 603[1].
stimulus, ii. 603[2].
stirp, ii. 603[2].
stoïcisme, ii. 604[1].
strabisme, 50[2], ii. 604[1].
structure, ii. 604[2].
stupeur, ii. 605[1].
stupidité, 300[1], ii. 605[1], ii. *605*[1].
style, ii. 605[2].
subalternation, ii. 606[1].
subalterne (proposition), ii. 726[1].
subconscient, ii. 606[1].
subcontraire, ii. 607[1].
subjectif, ii. 607[1].
subjectives (sensations), ii. 610[2].
subjectivisme, ii. 611[1].
sublime, ii. 611[2].
subordination, ii. 612[1].
subordonné (jugement), ii. 726[1].
subsistance, ii. 612[1].
substance, ii. 612[1], 614[1].
substance vivante, ii. 8[2].
substantialisme, ii. 614[1].
substitution, ii. 614[2].
subsumption, ii. 615[1].
subvention, ii. 612[1].
successif (contraste) des couleurs, 228[2].
succession, ii. 615[1].
succube, ii. 615[2].
suffisante (condition), ii. 143[1].
suffisante (grâce *or* vocation), 311[1].
suffisante (raison), principe de, ii. 616[1].
suffisante (raison), rien ne se fait sans, ii. 616[1].
suggestion, ii. 619[1].
suicide, ii. 620[1].
sujet, ii. 607[1].
Sunnites et Shyytes (Chiites), ii. 621[1].
supérieur (ton), ii. 252[2].
supérieur (étage) du pédoncule, ii. 663[2].
superstition, ii. 623[2].
supposition, ii. 624[2].
suppression, ii. 611[1].
suppression (et sélection) sociales, ii. 540[1].
supralapsarisme, ii. 625[2].
suprématie, ii. 331[2].
suprême (bonheur), 422[1].
suprême félicité, 422[1].
surajouté (quelque chose), 333[1].
surdi-mutité, 254[1].
surdité, 254[2], ii. 625[2].
surdité mentale (*or* psychique), 255[2].
surdité musicale, ii. 705[2].
surérogation, ii. 622[2].
surface, ii. 625[2].
surhumain, ii. 623[1].
surnaturalisme, ii. 623[1].
surnaturel, ii. 338[2], 623[1].
survivance du plus apte, 385[2].
syllogisme, ii. 628[2].
syllogisme (figure du), 382[2].
syllogisme épagogique, 329[1].
symbole, 243[1], ii. 640[1].
symbole d'Athanase, 84[1].
symboles, ii. 651[2].
symbolique, ii. 640[1], 651[1].
symbolique (logique), ii. 640[2].
symbolisme, ii. 651[1].
symétrie, ii. 651[2].
sympathie, ii. 652[1].
sympathie esthétique, ii. 653[1].
symptôme, ii. 653[2].
syn-, ii. 654[1].
syncinésie, 217[2].
syncope, ii. 628[1], 655[2].
syncrétisme, ii. 655[2].
syndérèse, ii. 655[2].
syndicat, ii. 716[2].
syndicat d'ouvriers, ii. 708[1].
synergie, ii. 658[1].
synergisme, ii. 657[2].
synesthésie, ii. 654[1].
synopsie, ii. *654*[2].
synthèse, ii. 658[1].
synthèse chimique, 175[1].
synthèse mentale (*or* psychique), ii. 658[2].
synthétique, ii. 658[2].
synthétique (forme), ii. **682**[1], ii. 678[2].
synthétique (jugement), 43[2].
synthétique (philosophie), la, ii. 659[1].
systématique (théologie), ii. 659[2].
système, ii. 659[1].
système d'assistance publique, ii. 309[2].
système d'impôts, ii. 663[1].
système de Ptolémée, ii. 396[1].
système industriel, *540*[2].
système mercantile, ii. 68[2].
système nerveux, ii. 153[2].
système vasomoteur, ii. 760[1].

tabes, 83[1], ii. 660[1].
table des couleurs, 196[2].
tabou, ii. 660[1].
tache aveugle, 121[2].
tachygenèse, 7[1].
tact (sensation de), ii. 707[1].
tactile (anesthésie), 45[1].
tactile (champ), 382[1].
tactile (sensation), ii. 707[1].
Talbot-Plateau (loi de), ii. 661[1].
Talmud, ii. 661[2].
tautologie, ii. 663[1].
taxonomie, 185[2], ii. 663[2].
tégument, ii. 663[2].
teinte, 197[1].
télégonie, ii. 663[2].
téléologie, ii. 664[1].
téléologique (argument), ii. 663[2].
télépathie, ii. 668[1].
témoignage, ii. 686[1].
tempérament, ii. 672[2].
tempérance, ii. 672[2].
température (sensation de), ii. 673[1].
température variable (animaux à), 193[1].
temporal (signe), ii. 673[2].
temporel et éternel, ii. 673[2].
temps, ii. 697[2].
temps (sens du), ii. 705[1].
temps de réaction, ii. 417[1].
temps passé (connaissance du), ii. 267[2].
temps perdu du muscle, 628[2].
temps présent, ii. 333[1].
tendance, 207[1], ii. 674[2].
tendons (sensation des), ii. 604[1], 674[2].
tension musculaire (sensation de), ii. 604[1].
tentation, ii. 674[2].
tenure, ii. 675[1].
tératologie, ii. 675[2].
terme, ii. 676[1].
terme général, 407[1].
terme moyen, ii. 77[2].
terre, 618[1].
terre (valeur de la), 618[1].
test, ii. 682[1].
Testament, ii. 686[1].
testament, ii. 686[1], 817[2].
tétanique (l'état), ii. 687[2].
tétanos, ii. 687[2].
théisme, ii. 688[1].
thème, ii. 691[2].
théocratie, ii. 692[1].
théodicée, ii. 692[1].
théologie, ii. 692[2].
théologie biblique, 116[2].
théologie dogmatique, ii. 692[2].
théologie morale, ii. 110[2].
théologie naturelle, ii. 137[2].
théologie pastorale, 60[2].
théologie positive, ii. 312[2].
théologie pratique, ii. 321[1].
théologie scolastique, ii. 495[2].
théologie systématique, ii. 659[2].
théologique (éthique), ii. 692[2].
théophanie, ii. 693[1].
théorème, ii. 693[1].
théorie, ii. 693[1].
théorie cellulaire, 169[1].
théorie de Copernic, 234[2].
théorie de la composition de l'esprit, 205[2].
théorie de la création, 242[1].
théorie de la descendance, 271[2].
théorie de la perception des couleurs, ii. 779[2].
théorie de la sensibilité, 453[2].
théorie de la transformation, ii. 712[1].
théorie de l'unité à deux faces, 295[1].
théorie des devoirs, 270[1].
théorie des erreurs, 340[1].
théorie des peines, ii. 276[1].
théorie des significations, ii. 529[1].
théorie mosaïque, ii. 111[2].
théorie spiritualiste, ii. 557[2].
théories de morale, 343[1].
théosophie, ii. 695[1].
thermique (sensation), ii. 673[1].
thermique (sensibilité), point de, ii. 673[1].
thèse, ii. 695[1].
Thomisme (le), ii. 696[1].
tic, ii. **696**[2].
tic convulsif, ii. 566[2].
tiers exclus (principe du), 356[2].
timbre, 195[1], ii. 697[1].
timidité, ii. 526[2].
timidité spontanée (*or* instinctive), 102[2].
tissu, ii. 705[2].
tissu social, ii. 541[1].
ton, ii. 705[2].
ton coloré, 197[1].
ton de combinaison, 198[1].
ton d'intermittence, 563[2].
ton émotionnel, 23[1].
ton supérieur, ii. 252[2].
tonique, ii. 706[1].
tons partiels, ii. 265[2].
topophobie, 27[1].
tort, ii. 706[1].
totem, ii. 706[2].
totémisme, ii. 706[2].
tout, 33[2], ii. 814[1].
trace, ii. 707[2].
Tractarianisme, ii. 707[2].
traction (sensation de), ii. 397[1].
tradition, ii. 708[2].
Traducianisme, ii. 709[1].
traduction, ii. 712[1].
tragique, ii. 709[1].
trance, ii. 709[2].
transcendance, ii. 710[2].
transcendant(al), ii. 710[2].
transcendantalisme, ii. 711[1].
transformation, ii. 711[2].
transformation (théorie de la), ii. 712[1].
transformisme, ii. 712[1].
transgression, ii. 712[1].
transitif, ii. 712[1].
transmission, ii. 712[2].
transmission de pensée, ii. 696[2].
transport, 76[2].
transposition, ii. 712[1], 713[1].
transsubjectif (le), ii. 713[1].
transsubstantiation, ii. 713[2].
traumatisme, ii. 713[2].
travail, 616[1], ii. 821[1].
travail (division du), 291[1].
travail (durée *or* heures de), 486[2].
tremblement, ii. 714[2].
tréphine, ii. 714[2].
triangle des couleurs, 197[2].
tribal (moi), ii. 715[1].
tribu, ii. 715[1].
tribunaux (jurisprudence des), 16[2].
trichotomie, ii. 715[1].
trilemme, ii. 715[1].
trinitarisme, ii. 715[2].
Trinité, ii. 715[2].
tristesse, ii. 557[1].
trithéisme, ii. 715[2].
troc, 101[2].
tromperie, 395[1].
trophique (influence), ii. 716[1].
tropisme, ii. 716[2].
trouble, ii. 287[1].
troubles de la personnalité, ii. 284[2].
troubles de la sensibilité, ii. 517[2].
troubles de la vision, ii. 799[1].
troubles de la volonté, ii. 816[2].
trust, ii. 716[2].
type, ii. 721[1].
type (retour au), ii. 438[1].
type divin, 290[1].
types mentaux, ii. 721[2].

ubication, ii. 723[1].
ubiquité, ii. 723[1].
ultime, ii. 723[2].
ultramontanisme, ii. 724[1].
un (l') et le multiple, ii. 201[1].
uni (sensation d'), ii. 480[1].
unicellulaires (organismes), ii. 726[1].
uniformité, ii. 727[1].
union hypostatique, 492[1].
unisson, ii. 731[2].
unitaire (naturalisme), ii. 726[2].
unitarianisme, ii. 734[1].
unité, ii. 731[2].
unité (*and* pluralité), ii. 734[1].
unité à deux faces (théorie de l'), 295[1].
unité dans la variété, ii. 736[2].
unité de Dieu, ii. 737[1].
unité de la conscience, ii. 68[1].
unité du moi, ii. 68[1].
unité sociale, ii. 541[1].
univers (l'), ii. 742[1], ii. 742[1].
universalisme, ii. 741[2].
universaliste (hédonisme), ii. 742[1].
universalité, ii. 742[1].
universel, ii. 737[1].

universel (rétablissement), 59[2].
universelle (conception), 208[1].
universelle (félicité), ii. 741[2].
universelle (nécessité), ii. 739[2].
usage, 250[1], ii. 744[1].
usage (hérédité par l'), ii. 744[2].
usage et désuétude, ii. 744[2].
usufruit, ii. 744[2].
usure, ii. 745[1].
utilitaires, ii. 745[2].
utilitarisme, ii. 745[1].
utilité, 360[1], 744[1], 745[2].
utilité (perte d'), 289[2].
Utopie, ii. 746[2].

vague, ii. 748[1].
valeur, ii. 749[2], 822[2].
valeur cardinale, 155[1].
valeur de la terre, 618[1].
valeur intrinsèque, 566[1].
valeurs accumulées, 154[2].
validité, ii. 748[2].
vanité, ii. 339[1].
variable, ii. 750[2].
variation, ii. 750[2].
variation négative, ii. 149[1].
variation orientée, 273[1].
variationelle (psychologie), ii. 759[1].
variations coadaptives, 190[1].
variations coïncidentes, 193[1].
variété, ii. 759[1].
variété (unité dans la), ii. 736[2].
vasomoteur (centre), ii. 759[2].
vasomoteur (système), ii. 760[1].
vasomoteurs (nerfs), ii. 759[2].
vaudoux, ii. 809[1].
védique (religion), ii. 760[1].
velléité, ii. 760[2].
vélocité, ii. 760[2].
vengeance, ii. 471[2], 760[2].
ventricule, ii. 760[2].
ventriloquie, ii. 760[2].
véracité, ii. 761[1].
verbal, ii. 761[2].
vérification, ii. 761[2].
vérité, ii. 720[2].
vérité (critérium de la), ii. 687[1].
vérité et fausseté, ii. 716[2].
vérité fondamentale, 397[2].
vérité générale, ii. 739[2].
vérités de fait, 368[1].
vérités de raisonnement, 368[1].
vérités des faits, ii. 808[1].
vérités éternelles, ii. 807[2].
version des Septante, ii. 521[2].
vertébré, ii. 762[1].
vertex, ii. 762[1].
verticaux apparents (déviation des méridiens), 276[2].
vertige, 291[1], ii. 762[1].
vertige de Ménière, 291[1].
vertu, ii. 764[1], [2].
vertus cardinales, 155[1].
vésicule germinative, 412[2].
vésicules cérébrales, 170[2].
vestige, ii. 763[1].
vibration, ii. 763[1].
vicariale (expiation), ii. 763[1].
vice, ii. 763[2].
vicieux (cercle), 183[2].
vide (le), ii. 747[1].
vie, ii. 5[1], 801[2].
vie (lutte pour la), 358[1].
vie (origine de la), ii. 243[1].
vie spirituelle (la), ii. 6[1].
virtualité, ii. 317[1].
virtuel, ii. 763[2].
vis viva, ii. 801[2].
visant au bonheur, 378[2].
visée (ligne de), ii. 527[2].
vision, ii. 765[1].
vision (troubles de la), ii. 799[1].
vision au cristal, 247[1].
vision binoculaire, 117[2].
vision indirecte, 533[2].
vision périodique, ii. 433[1].
vision stéréoscopique, ii. 602[1].
visualisation, ii. 801[2].
visuel (champ), 382[1].
visuel (rayon), ii. 8[1].
visuelle (ligne), ii. 801[1].
visuelle (sensation), ii. 781[1].
visuelle (acuité), caractères pour l'examen de l', ii. 686[1].
visuelle (perception) de la profondeur, 270[2].
visuelles (illusions), ii. 206[1].
visuels (champs), antagonisme (*or* lutte) des, ii. 470[2].
vitale (concurrence), 358[1].
vitalité, ii. 801[2].
vitesse, ii. 760[2].
viva (vis), ii. 801[2].
vivacité, ii. 802[1].
vivante (substance), ii. 8[2].
vive (force), ii. 801[2].
vivisection, ii. 802[1].
vivre pour autrui, 36[1].
vocales (cordes), ii. 802[1].
vocation suffisante, 311[1].
vocaux (organes), ii. 802[2].
voix, ii. 806[1].
vol (monomanie du), 189[2].
volantes (mouches), ii. 118[2].
volition, ii. 678[2], 806[1].
volition (acte de), ii. 806[2].
volitionnel, ii. 806[2].
volontaire, ii 809[1].
volontaire (décision), 381[1].
volontaire (illusion), ii. 513[2].
volontaire (reproduction), ii. 432[2].
volontarisme, ii. 807[1].
volonté, 206[2], ii. 678[2], 815[2].
volonté (troubles de la), ii. 816[2].
volonté de croire, ii. 818[1].
volonté générale, 407[1].
vue, ii. 765[1].
vue basse, ii. 142[2].
vue d'œil (estimation à), ii. 801[1].
Vulgate, ii. 809[2].

Waller (loi de), ii. 810[2].
Wallerienne (dégénérescence), ii. 810[2].
Wallerienne (méthode), ii. 810[2].
Weber (loi de), ii. 812[1].
Weismannisme, ii. 812[2].
Westminster (Confession de), ii. 813[2].

xénies, ii. 827[1].

yeux (loi des mouvements des), 295[1].

Zend-Avesta, ii. 828[1].
zone, ii. 828[2].
zones de His, ii. 828[2].
zoothéisme, ii. 829[1].
Zoroastrisme, ii. 829[1].

V. INDEX OF ITALIAN TERMS

[Prepared by Helen Green Baldwin.]

The reference numbers are printed in four different kinds of type: those in black type (**123**) are terms which occur as main topics in the work; those in modern face type (123) are the formally recommended equivalents; those in italic (*123*) are terms of which some exposition or discussion is given; and those in old style (123) are those which have passing mention only, but which are mentioned in a way judged of sufficient importance to require citation.

Under each kind of type the citations from vol. ii follow those from vol. i, and are preceded by the Roman numeral ii (which is not repeated); all other citations are from vol. i.

With the page number the column of the page is given in a small figure; where the small figure is omitted the reference is to both columns.

abbozzo, ii. 481[1].
abbreviamento (ontogenico), ii. 526[2].
abbaco, 1[1].
aberrazione (cromatica), 1[2]; (mentale), 2[1].
abilità, 2[1].
abitato, 436[1].
abito, 435[1].
abituarsi, 436[1].
abitudine, 435[1].
abnegazione, ii. 509[1].
aborigeni, 2[2].
abulia, 2[2].
acatafasia, 6[2].
acatamatesi, 6[2].
accademia, 6[2].
acceleramento (ontogenetico), 7[1].
accento, 7[1].
accentuazione, 7[2].
accidente (-tale), 7[2].
accomodamento, 8[2].
accomodazione, 8[1]; (visiva), 15[2].
accordi (consonanti), 219[2].
accordo, 27[2], 176[2].
accusa, 532[2].
acinesi, 28[2].
acquisito, 9[2].
acro-, 11[1].
acromatopsia, 9[1].
acumetria, 9[2].
acusma, 9[2].
acustica, 9[2].
acuto, 182[1].
adattabile, 15[2].
adattamento, 7[2], 14[2].
addizionale (suono), ii. 620[2].
adeguato, 16[1].
adendritico, 16[1].
adesione, 76[2].
adolescenza, 17[2].
adorazione, 18[2], ii. 822[2].
adottazionismo, 18[2].
afachia, 58[1].
afasia, 58[1]; (motrice), 58[1]; (del tipo Broca), 58[1]; (sensoriale), 58[1]; (del tipo Wernicke), 58[1].
afemia, 58[2].
affermare, ii. 310[2].
affermazione, 23[2], ii. 326[1].
affettivo, 21[2].
affetto, 22[2].
affitto, ii. 463[2].
afonia, 58[2].
afrasia, 58[2].
aftongia, 59[1].
agamogenesi, 24[1].
agente, 25[1].
agevolezza, 367[2].
aggiudicazione, 16[2].
agglutinazione, 25[1].
aggradevole, ii. 304[2].
aggregato, 25[2].
aggregazione, 26[1]; (istinto d'), 430[2].
agiologia, 437[2].
agnosticismo, 26[1].
agorafobia, 27[1].
Agostinianismo, 91[1].
agrafia, 27[2].
alalia, 28[2].
alcoolismo, 29[1].
alcoolofilia, 283[2].
alcuno, ii. 555[2].
alessia, 32[2].
alfabeto, 34[1].
algesia, 33[1].
algesici (punti), ii. 254[2].
alienazione mentale, 33[1].
alienista, 33[1].
allestesia, 33[2].
allochiria, 34[1].
allucinazione, 437[2].
alogia, 34[1].
alto tradimento, 476[2].
altro, 35[1]; (l'), ii. 484[2].
altruismo, 35[2].
amaurosi, 36[1].
ambidestro, 36[2].
ambiente, 328[2].
ambiguità, 36[2].
ambliopia, 36[2].
ameba, 37[2].
ametropia, 36[2].
amicizia, 396[2].
amimia, 36[2].
amissia, 37[1].
amitosi, 37[1].
ammirazione, 17[2].
amnesia, 37[2].
amor (di sè), ii. 510[2]; (proprio), ii. 510[2].
amore, ii. 31[1].
amortizzamento, 37[2].
ampiezza della sensazione, ii. 415[1].
ampliativo, 38[1].
amuleto, 38[1].
amusia, 38[2].
anabattisti, 39[1].
anabolismo, 39[1].
anafasi, 45[1].
anafesia, 65[1].
analgesia, 40[2].
analgia, 40[2].
analisi, 42[2]; (logica), 42[2]; (mentale), 43[1]; (psicologica), 43[2].
analogia, 41[1]; (di fede), 42[2].
anarchismo, 45[1].
anartria, 46[1].
anemia, 39[2].
anestesia, 39[2].
anestetici, 40[1].
anfibologia, 38[1].
anfimissi, 38[1].
angelo, 46[2].
angelologia, 46[2].
angoli di spostamento visuale, 47[1].
angolo dell' occhio, 153[2]; (facciale), 367[1].
anima, 413[2], ii. 557[2]; (del mondo), ii. 822[1].
animalculista, 48[2].
animalculo, 48[1].
animale, 47[1]; (a sangue freddo), 193[1].
animaletto, 48[1].
animali (domestici), 293[2].
animazione, ii, 678[1].
animismo, 48[2].
anisometropia, 49[2].
annientamento, 49[2].
annunziazione, 50[1].

anodino, 50[1].
anoia, 50[1].
anomalia (mentale), 50[2].
anormale, 2[2].
anortopia, 50[2].
anosmia, 50[2].
ansietà, 57[1].
antagonismo, 50[2]; (dei campi visivi), ii. 470[2].
antagonistico, 573[2].
antecedente, 51[1].
antenna, 51[1].
anticipazione, 56[1].
Anticristo, 55[2].
antinomia, 56[2].
antinomismo, 56[1].
antipatia, 57[1].
antitesi, 57[1].
antropoidi, 51[1].
antropologia, 52[2].
antropometria, 54[2].
antropomorfismo, 55[1].
apatia, 57[1].
aplasia, 59[1].
apocalisse, 59[1].
apocatastasi, 59[2].
apodittico, 59[1].
apogamia, 59[1].
Apollinarismo, 59[2].
apologetica, 60[1].
apoplessia, 60[1].
apoteosi, 60[2].
apparecchi, 605[1].
apparizione, 61[1]; (di Cristo), 180[2].
appercezione, 61[1].
appetenza, 62[1].
appetito, 62[1]; (basso), ii. 32[2].
apprendimento, 62[2].
apprezzamento, 62[2].
appropriatività, 11[1].
appropriazione, 64[1].
approvazione (morale), 63[2].
aprassia, 64[1].
aprosessia, 64[2].
aptica, 441[1].
arbitraggio, 65[1].
arbitrato, 65[1].
arbitrio, 97[2].
arborisazione, 65[2].
arcani, 65[2].
archeologia (preistorica), 65[2].
archetipo, 66[2].
architettura, 67[1].
argomento, 67[1]; (ontologico), ii. 202[2]; (teleologico), ii. 663[2].
Arianismo, 67[1].
Ariano, 74[2].
aristocrazia, 67[2].
aritmomania, 68[2].
Arminianismo, 68[2].
armonia, 441[2]; (prestabilita), ii. 329[2].
armonica, ii. 252[2].
armoniche, 441[2].
armonie (economiche), 306[1].
arte (teorie dell'), 69[2]; (decorativa), 258[1].
arteria, 73[2].
articolazione, 74[1].
ascetismo, 74[2].
asemia, 76[1].
asimbolia, 82[1].
asimmetria, 82[2].
asinergia, 82[1].
aspettazione, 359[2]; (messianica), ii. 71[1].
aspirazione, 76[2].
asprezza (del suono), 442[2].
asse (oculare), ii. 206[1]; (visuale), i. 801[1].
asserzione, 76[2].
assicurazione, 557[1].
assimilazione, 76[2].
associata (sensazione), 209[1].
associazione, 78[1], 79[1].
assolutismo, 4[2]; (estetico), 4[2].
assoluto, 3[1].
assoluzione, 4[1].
assorbimento, 4[2].
assunzione, 81[1].
assurdo, 6[2].
astenia, 81[2].
astenopia, 81[2].
astigmatismo, 81[2].
astratto, 5[1].
astrazione, 6[1].
atassia, 83[1].
atavismo, 83[1].
ateismo, 84[1].
atomismo (psichico), ii. 85[2].
atrofia, 85[2].
attacco (di male), 384[2].
attenzione, 85[2]; (distrazione dell'), 288[2]; (oscillazioni dell'), 387[1].
attesa, 359[2].
attimo, ii, 678[1].
attitudine, 64[2], 88[2].
attività, 13[1]; (mentale), 13[2]; (rappresentatrice), 504[1]; (propria), ii. 508[2].
atto, 11[2]; (legislativo), 321[2]; (del parlamento), ii. 601[2]; (di volontà), ii. 806[1].
attrazione, 89[2].
attributo, 90[1]; (divino), 90[1].
attrizione, 90[2].
attuale, 14[2], ii, 420[2].
attualità, 14[2].
aumento, 530[1].
aura, 92[1].
aurea (sezione), 416[1].
autenticità, 92[2].
autocinesi, 93[1].
autocrazia, 93[1].
automatico, 93[2].
automatismo, 93[2]; (psicologico), 95[1].
autonomia, 95[2].
autorità, 92[2].
autosuggestione, 96[1].
Averroismo, 96[2].
avuto, 620[2].
avvenimento, 351[1].
avvento, 19[1].
avversione, 97[1].
avvocato, 19[1].
azione, 12[1]; (giudiziaria), 12[1]; (e reazione), 12[2]; (morale), 211[1]; (disinteressata), 285[2]; (involontaria), 573[2]; (irrazionale), 575[1].
azzardo (giuoco d'), 403[1].

balbettamento, 616[2].
balbuzie, 616[2], ii. 593[1].
baratto, 101[2].
barica (sensazione), ii. 337[1], 812[1].
barocco, 101[2].
battesimo, 100[2].
battimenti, 103[2].
Battisti, 101[1].
bellezza, 104[1]; (linea di), ii. 8[1].
belligeranza, 113[2].
bello, 104[1].
bemolle, 181[1].
bene, 416[2]; (generale), 407[1]; (supremo), 477[1].
Benedettini, 113[2].
benessere, ii. 813[1].
benevolenza, 114[1].
bestemmia, 120[2].
Bibbia, 115[2].
bilancio, 100[1], 100[2].
bisogno, ii. 146[1], 811[1].
bio-corologia, 289[1].
biofori, 120[1].
biogenesi, 117[2].
biogenetico, 118[1].
biologia, 119[2].
bionomia, 120[1].
biotassi, 185[2].
Bizantino, 148[1].
bizzarria, 305[1].
blastocele, 121[1].
blastoderma, 121[1].
blastomero, 121[1].
blastoporo, 121[1].
blastosfera, 121[2].
blastula, 121[2].
bontà, 417[1].
borghese, 184[1].
brachi-, 125[2].
bregma, ii. 762[1].
Budda, 147[1].
bulbo, 147[2].

cabala, 149[1].
cacodemonia, 149[2].
cadenza, 149[2].
caduta, 371[2].
calcolo, 150[1].
calore (animale), 47[2]; (punto di), 453[1]; (latente), 628[2].
Calvinismo, 150[2].
cambiamento, 171[2].
campo (della coscienza), 381[2]; (di sguardo), 381[2]; (tattile), 382[1]; (visivo), 382[1].
canone, 152[2], 245[2].
canonizzazione, 153[2].
canto interno, 564[1].
capacità, 153[2].
capitale, 154[1]; (fisso), 386[1]; (circolante), 183[1].
carattere, 173[2]; (nazionale), ii. 128[2].
caratteri (acquisiti, &c.), 10[1]; (sessuali), ii. 524[1].

caratteristica, 173².
caricatura, 155².
cariocinesi, 598².
carioplasma, 598².
carità, 174¹.
Carmelitani, 155².
carnale, ii. 587¹.
casistica, 157¹.
caso (accidente), 171².
casta, 156².
castità, 175¹.
casuale, 157¹.
catabolismo, 598².
catafasia, 158².
catalessi, 158¹.
cataplessia, 159¹.
catarsi, 161².
catatonia, 598².
catatonismo, 599¹.
categorematico, 159².
categoria, 160¹, ii. 325².
categorico, 159².
categorie (postume), ii. 315².
cattiveria, ii. 37².
cattolicità, 163¹.
causa, 163¹; (ed effetto), 164¹.
causalità, 163¹.
cause (pluralità delle), ii. 306².
cecità, 122¹; (diurna), 253²; (psichica), 123¹; (dei colori), 195¹; (parziale pei colori), 279²; (musicale), ii. 183²; (psichica degli oggetti), ii. 192¹.
celenterati, 192¹.
celibato, 168¹.
cella (apolare), 59².
cellula, 168²; (spermatica), ii. 580².
cellulifugo, 169².
celomate, celomarii, 192¹.
celomati, 192¹.
cenestesi, 192².
centrale, 169².
centro, 169²; (di gravità), 169²; (di rotazione), ii. 759².
centrosoma, 170².
certezza, 81¹, 170², 171¹.
cervello, 126¹.
cessione, 76².
ceto (medio), 185¹.
chenosi, 599¹.
chenotismo, 599¹.
chiarezza, 146², 189¹.
chiaro e distinto, 189¹.
chiaroveggenza, 184¹.
Chiesa, 182¹; (cattolica), 162¹; (e Stato), 182¹.
Chiiti, ii. 621¹.
chiliasmo, 175².
chiromanzia, 176¹, ii. 255¹.
cielo, 453².
cilindrasse, 98², ii. 171¹.
cinesi, 601¹.
cinesica (immagine *or* sensazione), 599², 600¹.
cinesiodico, 601².
cinestetica (sensazione), 600¹.
cinestetico (equivalente), 599².
cinetica *or* cinematica (teoria della), 601².
cinetico, 601².
circolare, 183¹.
circolazione, 183², 249¹, 251¹.
circolo (vizioso), 183²; (cromatico), 196²; (del Müller), ii. 116²; (sensitivo), ii. 519².
circonvoluzione, 434².
Cistercensi, 183².
citologia, 251².
citoplasma, 251².
cittadino, 184¹.
civetteria, 240².
civile, 184¹.
civiltà, 247²; (epoche della), 248².
clan, 184².
classe (sociale), 185¹.
classificazione, 185².
cleptomania, 189².
clono, 190¹; (del piede), 49².
coalizione, 197².
codice, 190².
coefficiente, 191².
coercizione, 221¹.
coesistenza, 192².
cogitazione, 192².
cognizione, 192².
coincidenza, 193¹; (variazioni di), 193¹.
collasso, 193².
collaterali, 193².
collegazione, 194¹.
collera, 46².
collettiva (volontà), 407¹.
collettivismo, 193².
collettivo, 193².
colonia, 194¹.
colonna, 197².
colore, 194², 197¹; (complementare), 203²; (antagonistico), 51¹; (del suono), 195¹; (fondamentale), 195².
colori (ammonitori), ii. 811²; (mescolanza dei), 196²; (percezione da), ii. 779².
colpa, 247¹, 434¹; (stato di), 434².
colpevolezza, 247².
colpo, 60¹, ii. 526¹, 604².
combinazione, 197², 198¹.
comico, 198².
commercio, ii. 708¹.
commessura, 199¹.
compagnia, 201¹.
comparazione, 202¹.
compatibile, 202².
compenso, 202², ii. 472².
complesso, 203², 204¹.
complicazione, 204¹.
composita (immagine), 408².
composizione (e divisione), 205¹; (delle forze), 205¹; (mentale), 205².
composta (idea), 204².
composto, 204¹; (mentale), 205²; (suono), 205².
comprensione, 206¹.
compromesso, 206¹.
comunanza, 200².
comune, 199², 200².
comunismo, 200².
comunità, 200².
conato, 206².
concatenazione, 207¹.
concentrazione, 207².
concetto, 208¹; (universale), 208¹; (generale), 406²; (limite), ii. 7¹; (di numero), ii. 189¹.
concettuale, 208².
concezione, 208¹; (immacolata), 520¹.
conclusione, 209¹.
concomitante (sensazione), 209¹.
concomitanza, 209¹.
concordanza, 27²; (metodo di), 27².
concorrenza, 77¹, 202², 209².
concreto, 209².
concupiscenza, 209², ii. 32².
condizione, 210¹, ii. 593¹; (necessaria *and* sufficiente), ii. 143¹.
condizioni (mesologiche), 328².
condotta, 211¹, ii. 321¹.
confessione, 211¹; (di Augusta), 91¹; (di Basilea), 102¹; (belgica), 109²; (di Westminster), ii. 813².
conflitto (di leggi), 211².
conformità, 385¹.
confusione, 212¹; (mentale), 212².
confutazione, ii. 437².
congenito, 212².
congestione, 212².
congruenza, 213¹, 219¹.
conjugazione, 213¹.
connato, 214².
connessione, 214².
connotazione, 214².
conoscenza, 602²; (della dottrina), 333²; (di sè), ii. 510²; (relatività della), ii. 450².
copia, 235¹.
coppia, 239¹.
coprolalia, 234².
copula, 234².
consanguineità, 601².
conseguente, 218².
conseguenza, 218¹.
consenso, 217².
conservatismo, 219¹.
conservazione (dei ricordi), 218²; (delle forze), 218²; (propria *or* individuale), ii. 511².
considerazione, 219¹.
consumatore, 221².
consumo, 222¹, ii. 743¹.
contagio (sociale e psichico), 222².
contemplazione, 223².
contenuto, 223².
contesa (di parole), ii. 80².
contingente, 224¹.
continuità, 224¹.
contraposizione, 227¹.
contrassegno, ii. 43¹.
contrasto, 227¹; (binoculare), 228¹; (dei colori), 228¹; (suc-

cessivo dei colori), 228²; (visivo spaziale), 229¹.
contrattilità, 226².
contratto, 225²; (sociale), ii.534².
contravvenzione, ii. 87¹.
contrazione, 226².
controllo, 229¹; (esperimento di), 230¹.
contro-stimolo, 239¹.
controversia adiaforistica, 16¹.
controvolontario, 573².
convenevole, ii. 287¹.
conveniente, ii. 359².
convenienza, 384², 385¹, ii. 359².
convenzione, 230².
convergenza, 230².
conversione, 232²; (di debito), 398¹.
convinzione, 233¹.
convivenza, 201¹.
convulsione, 233¹; (clonica), 190¹.
cooperazione, 233², 234¹.
coordinazione, 234¹.
coraggio, 239².
Corano, 603².
corde vocali, ii. 802¹.
cordone, 197².
corea, 176².
coreomania, 252².
corno, 235¹.
corollario, 235².
corpo, 124¹, 236²; (e spirito), ii. 82².
corporazione, 235².
corpuscolo, 236².
correlazione, 236²; (d' adattamento), 190¹.
corrente (del pensiero), ii. 604².
correo (principale), ii. 341².
corte, 240¹.
cortesia, 199¹.
cosa, ii. 695¹; (in sè), 282¹.
coscienza, 215¹, 216²; (cristiana), 177²; (di classe), 217¹; (della similitudine), 217¹; (campo della), 381²; (riflessa in sè), 567²; (religiosa), ii. 462²; (di sè), ii. 509¹; (sociale), ii. 534¹; (stato di), ii. 598².
cosmogonia, 237².
costituzione, 219², 220¹.
costo, 238².
costrizione (morale), ii. 469².
costruzione (facultà di), 221².
costume (morale), 349¹.
costumi, 250¹.
craniologia, 240².
craniometria, 240².
creazione, 241²; (dottrina della), 242¹.
creazionismo, 242¹.
credenza, 110¹, 112².
credibile, 242².
credito, 242².
credo, 243¹.
credulità, 242².
crescente (prodotto), 529².
cresima, 211².
cretinismo, 243¹.
criminale, 244¹.
criminologia, 245¹.
crisalide, 182¹, ii. 401².
crisi, 245².
cristalloscopia, 247¹.
Cristianesimo, 177².
Cristo, 176²; (umiliazione di), 487².
Cristologia, 178¹.
criterio, 245²; (della verità), ii. 687¹.
critica (biblica), 115².
criticismo, 246¹.
croma, 181¹.
cromatica, 181².
cromatopseudopsia, 181².
cromatopsia, 181².
cromestesia, 181¹.
cromosoma, 181².
cronico, 182¹.
cruccio, ii. 826¹.
culto, 248²; (degli antenati), 46¹; (degli animali), 48¹; (del fuoco), 383²; (degli eroi), 475²; (della natura), ii. 142², 822².
cultura, 247².
cuore, 453¹.
cura (psichica *or* morale), ii. 85¹.
curiosità, 249¹.
curva, 249².
cutanea (sensazione), ii. 533¹.
cuticola, 251¹.

Daltonismo, 252¹.
Darwinismo, 253¹.
dato (il), 414¹.
debitore (principale), ii. 341².
decadenza, 256²; (sociale), ii. 538².
Decalogo, 256².
decisione, 257¹, 381¹, ii. 678².
declinazione, 257².
decretare una legge, 321².
deduzione, 258².
deficienza (mentale), 258².
definizione, 259¹.
deformazione, 260¹.
deformità, 260¹.
degenerazione, 260¹.
deglutizione, ii. 626¹.
deismo, 263².
delaminazione, 263².
deliberazione, 263².
delinquente (uomo), 244¹.
deliquio, ii. 655².
delirio, 264; (di grandezza), 420¹; (di persecuzione), ii. 281¹.
delitto, 243², ii. 200¹.
demenza, 265².
demerito, 266¹.
democrazia, 266².
demografia, 266².
demonio, 267¹.
demonolatria, 267¹.
demonologia, 267².
demonomania, 268¹.
demopsicologia, 387².
demoralizzazione, 269¹.
dendrito, 269¹.
denominazione, 269².
densità, 270¹.
deontologia, 270¹.
depressione, 270².
deprezzamento, 270¹.
derivazione, 271¹.
descrizione, 271².
desiderio, 62¹, 272¹.
despotismo, 272².
destrismo, 277¹, ii. 475¹.
determinanti, 273¹.
determinato, 273¹.
determinazione, 273²; (per sè *or* interna), ii. 509².
determinismo, 274¹.
deutoplasma, 274².
deviazione, 276¹; (dei meridiani), 276².
diacustica, 278¹.
diagnosi, 278¹.
diagramma (logico), ii. 28¹.
dialettica (*adj.* dialettico), 278¹.
diametro, 278².
dianoetico, 278².
diapason, ii. 302¹.
diatesi, 279¹.
diavolo, 267¹, 276².
dicotomia, 279¹.
didattica, 279².
diesis, *181*¹.
difetti (dell' udito), 452¹.
differenza, 280¹; (senso di), 280¹; (suono di), 281¹; (sensibilità di), ii. 517¹.
differenze (metodo delle), 280².
differenziamento, 281¹.
dilemma, 281².
dimorfismo, 282¹.
dimostrazione, 268².
dinamica, 302¹; (sociale), ii.534².
dinamogenesi, 302¹.
Dio (idea di), 415¹; (uno e trino), ii. 715².
Diofisiti, 302².
dioico, 282¹.
diotelismo, 303¹.
diottrica, 282².
diplogenesi, 283¹.
diplopia, 283¹, 296¹.
dipsomania, 283².
direzione, 283²; (linea di), ii. 8¹; (raggio di), ii. 417¹.
diritti (naturali), ii. 134¹.
diritto, 640¹; (amministrativo), 17¹; (processuale), 16²; (positivo), *16*²; (canonico), 153¹; (civile), 184¹; (di consuetudine), 199²; (comparato), 201²; (costituzionale), 220²; (usuale), 250¹; (divino), 290¹; (internazionale), 564², ii. 474; (obbiettivo), ii. 193²; (positivo), ii. 312¹; (consuetudinario), ii. 744¹; (privato), ii. 343²; (pubblico), ii. 396²; (romano), ii. 478¹; (filosofia del), ii. 594¹.
dirittura, ii. 744².
dis-, 303².
disaggradevole, ii. 304².
disarmonia, 285².
disattenzione, 528².
discendenza (teoria della), 271².

discernimento, 284[1].
disciplina, 284[1].
disco (di Newton), 196[2].
discorsiva (facoltà), 285[1].
discreto, 284[2].
discriminazione, 284[2].
discromatopsia, 195[1].
disegno, 272[1], ii. 678[2].
disfasia, 58[1].
disgiuntivo, 286[1].
disgregazione, 288[1].
disintegrazione, 285[2].
disordine, 271[1]; (morale), 286[1].
disparato, 286[2].
dispensa, 287[1].
disperazione, 485[2].
dispiacere, ii. 304[2].
disposizione, 287[2]; (all' emozione), 317[2].
dissemia, 76[1].
disseminazione, 287[1].
dissociazione, 288[1].
dissonanza, 284[1], 288[2].
distanza (percezione della), 270[2].
distinzione, 284[2].
distrazione, 3[1], 288[2]; (dell' attenzione), 288[2].
distribuzione, 289.
disubbidienza, ii. 191[1].
disuso, 273[1], ii. 744[2].
divenire, 109[1].
divinazione, ii. 35[1].
divinità, 415[2].
divino (tipo), 290[1].
divisibilità, 290[2].
divisione, 290[2]; (del lavoro), 290[1]; (riduttiva), ii. 435[2].
Docetismo, 291[1].
documentaria (ipotesi), 291[2].
dogma, 291[2].
dogmatica, 292[2].
dogmatismo, 292[2].
dolicocefalo, 293[1].
dolo, 293[1].
dolore, 293[1], ii. 616[1]; (morale), 431[1]; (sensazione di), ii. 254[1]; (e piacere), ii. 253[1]; (punti di), ii. 254[2].
domanda, 265[1], ii. 623[2]; (reciproca), ii. 429[2].
Domenicani, 294[1].
domestico, 293[2].
domicilio, 294[1].
dominio, 266[1]; (eminente), 316[1]; (di sè), ii. 509[1].
Donatisti, 294[2].
donazione, 294[2].
dottrina (animistica), 48[2]; (psicologica dell' associazione), 80[1]; (della creazione), 242[1]; (dei doveri), 270[1]; (della conoscenza), 333[2]; (di Occam), ii. 199[1]; (dei millenarii), ii. 79[1]; (della fede), ii. 301[2]; (di Ritschl), ii. 475[2].
dovere, 301, ii. 251[2].
dritto, ii. 474[1].
Drusi, 297[2].
dualismo, 298[1].
dubbio, 296[1]; (follia del *or* monomania), 296[2].
durata (minima), 300[2], ii. 615[1].
ebbrezza, 540[2].
Ebioniti, 304[1].
ecceità, ii. 695[2].
eccellenza, 355[2].
eccentrica (proiezione *or* localizzazione), 304[2].
eccentricità, 305[1].
eccesso (di produzione), ii. 252[1].
eccitabilità, ii. 519[1].
eccitamento, 356[1], ii. 603[2].
eccitazione, 356[1].
eclampsia, 305[2].
eclettismo, 305[2].
ecolalia, 305[1].
ecologia, ii. 200[1].
economia (dinamica), 301[2]; (politica), 307[1]; (principio dell'), 309[1]; (matematica), ii. 47[1]; (statica), ii. 600[1].
economica, 305[2]; (legge), 306[1].
economiche (armonie), 306[1].
economico (metodo), 306[2]; (motivo), 307[1]; (equilibrio), 337[1].
ectoderma, 310[1].
ectoplasma, 310[1].
edonico, 453[2].
edonismo, 454[1]; (universalista), ii. 742[1].
edonistico (elemento), 453[2].
edonologia, 453[2].
educazione, 310[1]; (formale), 392[1].
effeminatezza, 311[1].
efferente, 311[1].
egoismo, 312[2], ii. 510[1].
eguaglianza, 337[1].
ejettivo, 312[2].
elaborazione, 313[1].
elementi (sensoriali e motori), ii. 520[1].
elemento, 313[2]; (affettivo), 23[1]; (della coscienza), 313[2]; (edonistico), 453[2].
elettrici (organi), 313[1].
elettrobiologia, 313[2].
eliminazione, 313[2]; (sociale), ii. 540[1].
Ellenismo, 466[1].
ellenizzante, 466[1].
emanazione, 314[1].
emancipazione, 314[2].
embriologia, 315[2].
embrione, 314[2].
emeralopia, 253[2], 467[1].
emi-, 467[1].
emianopsia, 467[1].
emicrania, ii. 77[2].
emmetropismo, 316[2].
emorragia, 468[1].
emotiva (espressione), 317[2].
emotività, 317[2].
emozione, 316[2]; (disposizione all'), 317[2].
empirica (logica), 318[2].
empiriocriticismo, 321[1].
empirismo, 321[1].
emulazione, 321[2].
encefalo, 126[1].
enciclopedia, 322[1].
Enciclopedisti, 322[1].
endoderma, 324[1].
endofasia, 564[1].
endotelio, 324[2].
endottici (fenomeni), 327[2].
endovisione, ii. 801[2].
energia, 325[1]; (conservazione dell'), 218[2]; (specifica), ii. 567[2].
energismo, 324[2].
Engel (legge di), 326[2].
enoteismo, 468[1].
ente, 109[2].
enterozoi, 327[1].
entimema, 327[2].
entoderma, 324[1].
entozoi, 328[2].
entusiasti, 327[1].
ependima, 324[2].
epiblasto, 329[1].
epicherema, 329[1].
epicureismo, 329[1].
epidemia (psichica), 330[1].
Epifania, 333[1].
epifenomeno, 333[1].
epifisi, 333[2].
epigenesi, 330[1].
epiglottide, 330[2].
epilessia, 330[2]; (Jacksoniana *or* corticale), 577[1].
episillogismo, 337[1].
epitelio, 337[1].
epoche (della civiltà), 248[2].
equazione (personale), ii. 283[1].
equilibrio, 100[1], 338[1]; (economico), 337[2]; (senso dell'), 338[1]; (instabile), ii. 743[2].
equipollenza, 338[1].
equità, 338[2].
equivalente (meccanico), ii. 59[1].
equivoco, 338[2], 339[1].
Erastianismo, 339[1].
eredità, 471[1], 546[2].
eresia, 474[1].
eretismo, 339[2].
ermafrodito, 475[1].
ermeneutica, 475[1].
eroi (culto degli), 475[2].
erotomania, 340[1].
errore (costante), 219[2], ii. 716[2].
errori (teoria degli), 340[1].
esaltazione, 355[1].
esclusione (metodo di), 356[2].
esecutivo (potere), 357[1].
esegesi, 357[2].
esercizio, 357[2].
esistenza, ii. 421[1]; (lotta per l'), 358[1]; (giudizio di), 359[1].
esogamia, 359[1].
esorcismo, 359[2].
esoterico, 341[1].
espansione (dell' emissione), 546[1].
esperienza, 360[2]; (del Meyer), ii. 77[1]; (dello Scheiner), ii. 490[1].
esperimento, 362[1]; (di controllo), 230[1]; (di Ferrier), 379[1]; (dubbio *or* nullo), ii. 404[1].
espiazione, 85[1], ii. 763[2].
esplicazione, 362[2].
Esseni, 341[2].
essenza, 341[2].
essere, 109[2].
estasi, 309[1].
estensione, 363[2], 364[2], ii. 503[1]; (della sensazione), ii. 415[1].

estensività, 365[1].
estensore (muscolo), 386[2].
esteriorità, ii. 251[2].
esterni (oggetti), 365[1].
estesia, 19[2].
estesiodico, 20[1].
estesiogeno, 19[2].
estetica, 20[1], 33[1]; (misura), 21[2].
estetico, 20[1].
estirpazione, 366[1].
estrinseco, 566[1].
etere, 342[2].
eterestesia, 33[2].
eternità, 342[1]; (di Dio), 342[2].
eterno, ii. 673[2].
eterogamia, 476[1].
eterogeneità, 483[2].
eterolecito, 476[1].
eteromorfosi, 476[1].
eteronomia, 476[1].
eteropsicologica (morale), 476[2].
etica, 346[1]; (intuitiva), 569[2]; (sociale), ii. 535[1]; (teologica), ii. 692[2].
etimologia, 349[1].
etiologia, 21[2], 349[1].
etnografia, 348[1].
etnologia, 348[1].
etnopsicologia, ii. 414[1].
etologia, 348[2].
Eucaristia, 349[2].
eudemonismo, 350[1].
Eusebiani, 351[1].
Eutichianismo, 351[1].
euristico (metodo), 476[2].
evangelo, 417[1].
evento, 351[1].
evidente, 351[2].
evidenza, 351[2], 352[1], 432[1].
evocazione, 353[1].
evoluzione, 353[1]; (mentale), 354[2]; (fattori dell'), 368[1]; (teoria dell'), 271[2]; (saltuaria *or* a salti), ii. 484[2]; (e progresso sociali), ii. 535[2].
experimento d'Aristotile, 68[2].
explicito, 525[2].

facciale (angolo), 367[1].
facilitazione, 367[2].
facoltà, 369[1]; (attive), 12[2]; (conativa), 206[2]; (di costruzione), 221[2]; (di generalizzare), 408[1]; (morale), ii. 104[1].
fallo, 375[2].
falsità, 373[2], ii. 716[2].
falso, 373[2].
famiglia, 373[2].
fanatismo, 374[1].
fantasia, 374[1].
fantasma, ii. 288[1].
fantastico, 374[2].
fariseismo, ii. 288[1].
fascino, 353[1].
fase, ii. 288[2].
fatica, 374[2].
fatto, 367[2].
fattore, 368[1]; (dell' evoluzione), 368[1]; (della produzione), 368[2].
fecondazione, 379[2].
fecondità, 379[2].
fede, 112[2], 369[2]; (filosofia della), 370[2].
fedeltà, 33[2]; (di riproduzione), 381[2].
federazione (con-), 377[1].
felicità, 350[2], 378[2], 441[1]; (suprema), 422[1]; (massima), 422[2]; (universale), ii. 741[2].
felicitare, 378[2].
femmina, 378[2].
fenomenismo, ii. 288[2].
fenomeno (endottico), 327[2], ii. 289[1]; (di Purkinje), ii. 403[2].
fenomenologia, ii. 289[1].
fertilità, 379[2].
feticcio, 380[1].
feticismo, 380[1].
fideismo, 370[2].
Figlio (di Dio), ii. 556[1].
figura, 382[1].
figurativo, 382[1].
figure (del sillogismo), 382[2].
filantropia, ii. 289[2].
filogenesi, ii. 299[2].
filogenia, ii. 299[2].
filologia, ii. 290[1].
filosofema, ii. 290[1].
filosofia (della fede), 370[2]; (dell' identità), 506[2]; (della storia), 477[2]; (storia della), 480[1]; (dell' immanenza), 520[2], ii. 290[2]; (Socratica), ii. 549[1]; (presocratica), ii. 334[1]; (sociale), ii. 538[2]; (sintetica), ii. 659[1]; (della natura), ii. 142[1]; (patristica), ii. 268[2].
finale, 324[2].
finanza, 383[2].
fine, 28[2], 323[2], ii. 678[2].
finestra laterale (esperimento della), ii. 527[1].
finito (il), 383[2].
finzione, ii. 37[1]; (legale), ii. 2[1].
fisica (scienza), ii. 300[1].
fisiocrati, ii. 300[1].
fisiologia, ii. 300[2].
fisiologica (selezione), ii. 300[2].
fisonomia, ii. 300[1].
fissarsi (dei ricordi), 386[2].
fissazione, 386[1], ii. 198[2].
flessione, 386[2].
flessore (muscolo), 386[2].
-fobia, ii. 296[1].
foglietta, 387[2], ii. 70[1].
folla, 246[2].
folle, 241[2].
follia, 387[1]; (del dubbio), 296[2], 550[1].
fondamentale (suono), 397[2]; (verità), 397[2], ii. 341[1].
fondamento, 398[1]; (dell' universo), ii. 822[1].
fondo-salario, ii. 810[1].
fonetiche (leggi), ii. 296[2].
fonologia, ii. 296[2].
forense, 390[1].
forma, 390[2].
formale (educazione), 392[1]; (logica), 392[1].
formali (studii), 391[2].
formalismo, 390[2].
formicolio, ii. 697[1].
foro, 393[2].
foronomia, ii. 297[2].
fortezza (d' animo), 393[2].
forza (centrifuga e centripeta), 170[1], ii. 604[2]; (viva), ii. 801[2]; (sociale), ii. 537[1].
forze (bionomiche), 119[2]; (conservazione delle), 218[2], 388[2]; (parallelogramma delle), ii. 259[1].
fossa centrale, 394[1].
fotometria, ii. 297[2].
fovea centralis, 394[1].
Francescani, 394[2].
franchigia, 394[1].
frangia, 397[1].
fraternità, 394[2].
frenesia, 396[2].
frenologia, ii. 298[2].
frode, 395[1].
funzione, 397[2]; (costruttrice), 221[2]; (mentale), 397[2].
fuoco (culto del), 383[2].
furore, 398[1].
fusione, 121[2], 398[1].
futuro (sentimento del), 399[2].

Gallicanismo, 400[1].
gangliare (plesso), 405[1].
ganglio, 405[1].
ganglioblasto, 404[2].
ganglioceto, 405[1].
gastrea (teoria della), 405[2].
gelosia, 578[1].
gemmula, 405[2].
generale (termine), 407[1]; (concetto *or* nozione), 406[2]; (bene), 407[1].
generalizzare (facoltà di), 408[1].
generazione 408[1]; (alternante), 35[1]; (eterna), 342[1]; (spontanea), ii. 587[2].
genere, 405[2], 411[2], 600[1]; (umano), ii. 41[1].
generico, 408[2].
generosità, 409[1].
genesi, 409[2].
genetica (psicologia), 410[1]; (selezione), ii. 465[2].
genetico, 409[2]; (metodo), 409[2].
genio, 410[1].
geometria, 412[1].
germe, 412[1].
germinale (selezione), 412[1].
germinativa (vescicola), 412[2].
germinazione, 412[2].
germiplasma, 412[2].
gestazione, 413[1].
Gesù, 579[1].
Gesuitismo, 579[1].
ghiandola (pineale), 333[2].
Giansenismo, 577[2].
giardino d' infanzia, 601[1].
ginocchio, 411[2].
gioja, 580[1].
Giudaismo, 580[1].
giudicato, 583[2].
giudiziario, 584[1].
giudizio, 580[2]; (analitico e sintetico), 43[2]; (finale, &c.), 584[1]; (di esistenza), 359[1]; (morale), ii. 105[1]; (pratico), ii. 320[1].

giunture (sensibilità delle), 580[1].
giuoco, ii. 303[2]; (impulso al), ii. 304[2]; (d' azzardo), 403[1].
giuridico, 584[2].
giurisdizione, 393[2], 584[2]; (marittima), 17[1].
giurisprudenza, 156[1], 584[2].
giurista, 585[1].
giustificazione, 587[1], ii. 475[1]; (di sè), ii. 512[2].
giustizia, 585[1], ii. 474[2].
glandula, 414[2].
gnoseologia, 333[2], 414[2].
gnosi, 414[2].
gnosticismo, 414[2].
gnostico, 414[2].
governo (di sè), 229[1]; (divino), 418[2].
grado, 263[2].
grafico (metodo), 420[1].
grafologia, 420[2].
grammatica, 419[2].
granchio, ii. 826[2].
grandezza (delirio di), 420[1], ii. 36[2].
gratitudine, 421[1].
gravidanza, 413[1].
gravità (specifica), ii. 567[2].
gravitazione, 421[2].
grazia, 418[2], 419[1]; (sufficiente), 311[1].
graziosità, 418[2].
Greci (scuole filosofiche dei), ii. 495[2].
grottesco, 432[2].
gruppo, 432[1]; (selezione di), 433[1].
guadagni, 304[1].
guadagno (lordo), 431[2].
guerra, ii. 811[1].
gustative (sensazioni), ii. 662[2].
gusto, ii. 662[1].

Herbartianismo, 468[2].

ibernazione, 476[2].
ibrido, 488[2].
iconolatria, 516[2].
ictus, ii. 604[2].
idea, 498[1]; (astratta), 5[1]; (composta), 204[2]; (fissa), 386[1]; (di Dio), 415[1].
ideale, 499[1].
idealismo, 500[2]; (spiritualistico), 521[1].
idealistico (realismo), ii. 421[2].
idealità, 504[1].
ideazione, 504[1].
idee (coatte), 524[2]; (innate), 548[2]; (morbose), ii. 281[1].
identici (punti), 504[1].
identificazione, 505[2].
identità (individuale), 504[2]; (materiale), 505[2]; (filosofia dell'), 506[2]; (personale *or* dell' io), ii. 283[2].
ideogramma, 507[1].
ideologia, 507[2].
ideomotore, 507[2].
ideoplasia, 507[2].
ideoplastico, 507[2].
idiopatico, 510[1].
idioplasma, 510[1].
idiopsicologica (morale), 510[1].
idiosincrasia, 510[2].
idiotismo, 507[2].
idiozia, 50[1], 507[2].
idolatria, 511[1].
idolo, 510[2].
idrocefalia, 488[2].
ignoranza, 511[1].
illazione, 542[2]; (probabile), ii. 353[2].
illusione, 511[2]; (psichica), 264[2]; (dell' orientazione), ii. 242[2]; (dei sensi), ii. 517[2].
illusioni (di movimento), 512[2]; (visive *or* ottiche), ii. 206[1].
ilozoismo, 489[1].
imbecillità, 519[1].
imitazione, 519[1]; (plastica), ii. 302[2].
immacolata (concezione), 520[1].
immaginazione, 517[1].
immagine, 516[1]; (persistente), 23[2]; (consecutiva), 23[2]; (da congruenza), 213[1]; (composita), 408[2].
immagini (culto delle), 516[2]; (di Purkinje, di Sanson), ii. 403[2].
immanenza, 520[2]; (filosofia dell'), 520[2].
immaterialismo, 521[1].
immedesimazione, ii. 653[1].
immediato, 521[2].
immortalità, 523[2]; (condizionale), 210[2].
immutabilità, 524[1].
impenetrabilità, 524[1].
impensabile, ii. 743[2].
imperativo (categorico), 160[1].
impercettibile, 525[1].
implicito, 525[2].
importanza, 526[1].
impossibilità, ii. 313[1].
impresario, 328[2].
impressione, 526[1].
impressionismo, 526[2].
impulso, 527[1]; (al giuoco), 304[2]; (artistico), 73[2]; (al furto), 189[2].
imputazione, 527[2].
inabilità, 2[1], 528[1].
incantare, 174[2].
incanto, 174[2].
incapacità, 528[2].
incarnazione, 528[2].
incespicare, ii. 605[2].
inclinazione, 529[1].
incoerenza, 529[1].
incompatibilità, 529[1].
inconoscibile, ii. 742[2].
inconsapevolezza, ii. 725[1].
inconscio, ii. 724.
incoordinazione, 529[2].
incosciente, ii. 724[1]; (stato), ii. 725[1].
incoscienza, ii. 725[1].
incredibile, 242[2].
incredulità, 242[2].
incremento, 530[1]; (marginale), ii. 42[1].
incrociamento, 258[1].
incubo, ii. 177[2]; (della veglia), 253[2].
indemoniamento, ii. 313[1].
indennità, 530[1].
indeterminismo, 530[2].
indice, 531[1]; (numero), 532[2].
indifferenza, 532[2]; (punto d'), 533[1].
indipendenza, 530[2].
indiretta (visione), 533[2].
indiscernibili, 534[1].
individuale, 534[1]; (psicologia), 538[2]; (identità), 504[2]; (selezione), 538[2].
individualismo, 538[2].
individualistico, 539[1].
individualità, 539[1].
individuo, 534[1]; (sociale), ii. 548[2].
indulgenza (plenaria), ii. 305[1].
industria, 540[2]; (locale specializzata), ii. 20[2].
industriale, 540[2].
industrialismo, 540[2].
induzione, 329[1], 539[1].
inerenza, 546[2].
inerzia, 541.
infallibilità, 541[2].
infanzia, 542[1].
infecondità, ii. 602[2].
infedeltà, 544[1].
infermità (di mente), 204[2]; (mentale), 550[1].
inferno, 465[1].
infiammazione, 545[2].
infinità, 545[2].
infinitesimale, 545[2].
infinito, 544[1].
inflessione, 546[1].
influenza, 546[1].
infralapsarianismo, 546[1].
ingenito, 548[2].
ingenuo, ii. 127[1].
ingiustizia, ii. 826[2].
ingiusto, ii. 826[2].
inibizione (mentale), 546[2]; (nervosa), 547[2].
iniziazione, 548[2].
innato, 214[2], 548[2]; (idee innate), 548[2].
innervazione (senso di), 549[1].
inquisizione, 549[2].
insetti, 553[2].
insonnia, ii. 534[1].
insonnio, 554[2].
inspirazione (plenaria), 305[1].
instabilità, 555[1].
instituzione, 556[2].
integrale, 557[2].
integrazione, 558[1].
integrità, 204[2].
integumento, ii. 663[2].
intellectualismo, 559[1].
intelletto, 558[2].
intelligenza, 558[2].
intendimento, ii. 725[2].
intensità, 559[2]; (luminosa), 146[2].
intento, 560[1].
intenzione, 561[1], ii. 678[2].
interazione, 561[2].
intercessione, 562[1].
interesse, 562[1], 563[1]; (proprio), ii. 510[1].
interferenza, 563[2].
interno, 564[1].

interpretazione, 564[2]; (anagogica), 40[1].
intersuggettivo, 565[1].
intervallo, 565[1].
intoppare, ii. 605[2].
intossicazione, 565[2].
intraprenditore, 328[2].
intrinseco, 566[1].
introjezione, 566[1].
introspezione, 567[2], ii. 198[1].
intuito, 568.
intuizione, 544[1], 568; (morale), 568[2].
intuizionismo, 570[1].
inutilità, 289[2].
invaginazione, 570[2].
invenzione, 570[2].
invertebrato, 573[1].
investimento, 573[2].
invidia, 578[1].
involontario, 573[2].
involuzione, 574[1].
io (l'), 507[2]; (soziale, tribole), ii. 715[1].
iper-, 489[1].
ipermetropia, 489[2].
ipertrofia, 489[2].
ipnagogico, 489[2].
ipnogeno, 490[1].
ipnosi, 490[1].
ipnotismo, 490[2].
ipo-, 491[1].
ipoblasto, 491[1].
ipocondria, 491[1].
ipostatica (unione), 492[1].
ipotesi, 492[1]; (documentaria), 291[2]; (della nebulosa), ii. 142[2].
ipotetico, 492[2].
ironia, 574[2].
irradiazione, 574[2].
irragionevole, ii. 426[1].
irreale, ii. 743[2].
irreligione, 575[2].
irrilevante, 575[1].
irritabilità, 575[2], 356[1].
irritante, 575[2].
Islamismo, ii. 95[1].
isolamento, 576[1].
ispirazione, 555[1].
isterismo, 494[1].
istero-epilessia, 496[2].
istintiva (moralità), 556[1].
istinto, 552[2]; (di appropriazione), 11[1]; (artistico), 73[2]; (d' aggregazione), 430[2]; (religioso), ii. 462[2].

jettatura, 353[1].
Jeova, 578[1].

Kantianismo, 588[1].
Kantismo, 588[1].

laboratorio, 605[1].
laido, ii. 723[1].
lalo-, 616[2].
lalomimesi, 305[1].
lama terminale, 324[2].
Lamarckismo, 617[1].
lamella, 387[2].
languore, 369[1], 627[2].
larva, 628[1].
lasciar fare, 616[2].
lasciar passare, 616[2].
latenza, 628[1].
lavoro, 616[1], ii. 821[1]; (divisione del), 291[1]; (ore di), 486[2].
lega operaia, ii. 708[1].
legale, 390[1], ii. 2[1].
legge, 639[2], 640[1]; (di Baer), 100[1]; (biontogenetica), 118[1]; (dell' associazione di contiguità), 224[1]; (di contraddizione), 226[2]; (dell' associazione di contrasto), 228[2]; (di Donders), 295[1]; (economica), 306[1]; (di Engel), 326[2]; (di Fechner), 376[2]; (di Fourier), 394[1]; (di Gresham), 430[2]; (morale), 641[1]; (di Listing), ii. 8[2]; (di Malthus), ii. 38[2]; (naturale), ii. 133[2]; (di Waller), ii. 810[1]; (di Weber), ii. 812[1]; (di assistenza pubblica), ii. 309[2]; (di orientazione costante), ii. 242[2]; (scritta), ii. 601[2]; (di Talbot-Plateau), ii. 661[1].
leggenda, ii. 2[1].
leggi (del pensiero), 641[1]; (fonetiche), ii. 296[2].
legislazione, ii. 2[2].
legittimazione, ii. 2[2].
legittimo, ii. 2[2].
lemma, ii. 3[1].
lesa maestà, 476[2], ii. 3[1].
letteratura orfica, ii. 250[1].
lettura del pensiero, ii. 120[1].
lezione obbiettiva, ii. 192[1].
liberalismo, ii. 4[1].
liberi pensatori, 396[2].
libero, 395; pensiero, 396[2].
libertà, 305[2], 395[1], ii. 4[1]; (sentimento della), 396[1]; (religiosa), ii. 4[1].
limine, ii. 7[2].
limitativo, ii. 6[2].
limite, ii. 7[1]; (concetto), ii. 7[1]; (di coltivazione), ii. 41[2].
linea (di bellezza), ii. 8[1]; (di direzione), ii. 8[1]; (di mira), ii. 8[1]; (visuale), ii. 8[1]; (di sguardo), ii. 527[2].
linee di Fraunhofer, 395[1].
linfa, ii. 33[2].
linguaggio, 618[1]; (mimico), 413[1]; (interno), 564[1]; (funzione del), 626[1].
lisi, 245[2].
locali (segni), ii. 15[1].
localizzazione (eccentrica), 304[2]; (spaziale delle sensazioni uditive), ii. 20[1].
localizzazioni funzionali del cervello, ii. 15[2].
locomotore, ii. 20[2].
locomozione, ii. 20[2].
lodevole, ii. 323[1].
logica (empirica), 318[2]; (formale), 392[1]; (esatta), ii. 20[2], 23[2]; (materiale), ii. 44[2]; (della matematica), ii. 47[1]; (simbolica), ii. 640[2]; (sociale), ii. 537[1].
logico, ii. 27[2].
logistiche (macchine), ii. 28[2].
logo-, ii. 30[1].
lotta per l' esistenza, 358[1].
luce (acromatica, sensazione di), 146[2]; (propria della retina), 510[1].
lucidità, ii. 31[2].
lume, ii. 768[2]; (naturale), ii. 6[1].
luminosa (sensazione), ii. 6[1].
lunatico, ii. 32[2].
lupo-mannaro, ii. 813[2].
lusso, ii. 33[2].
lustro, ii. 32[2].
Luteranismo, ii. 33[1].

macchine (logistiche), ii. 28[2].
macrocosmo, ii. 34[1].
maggiore, ii. 37[1].
magia, ii. 35[1], ii. 557[1].
magnetismo, ii. 36[2].
mal (occhio), 353[1]; (caduco), 330[2].
malattia, 285[1]; (della personalità), ii. 284[2].
male, 352[2].
malevolenza, ii. 37[2].
malinconia, ii. 61[1].
malizia, ii. 38[1].
mammifero, ii. 38[2].
mancamento (senso di), 369[1].
mancinismo, 277[1].
mandante, ii. 341[2].
mania, ii. 39[2]; (saltatoria), 252[2].
Manicheismo, ii. 40[2].
manifestazione, ii. 41[1].
Maomettismo, ii. 95[1].
marmaglia, ii. 89[1].
maschio, ii. 37[2].
massa, ii. 44[1].
massima, ii. 55[1]; (giuridica), ii. 55[2].
matematica, ii. 47[2].
materia, ii. 49[1]; (vivente), ii. 8[2]; (e forma), ii. 50[1].
materialismo, ii. 45[1].
matriarcato, ii. 48[2].
matrimonio, ii. 43[2].
matronimico, ii. 76[2].
matto, 241[2], ii. 34[1].
me (il), ii. 507[2].
meccanica, ii. 59[1].
meccanico, ii. 58[2].
meccanismo, ii. 59[2].
medesimo (il), ii. 484[2].
media (quantità), ii. 56[1].
mediano (valore), ii. 56[1].
mediato, 521[2], ii. 59[2].
mediazione, ii. 59[2].
medicamenti (azione dei), ii. 376[1].
medio, ii. 60[1].
meditazione, ii. 60[1].
medium, ii. 60[1].
megalomania, 420[1], ii. 60[2].
memoria, ii. 63[1]; (organica), ii. 213[2].
meninge, ii. 67[1].
meningite, ii. 67[1].
mentalità, ii. 68[2].
mente, ii. 82[1]; (m.-sostanza, teoria della), ii. 86[1].
menzogna, ii. 4[2].
meraviglia, ii. 820[2].
mercanzia, 199[1].
mercato, ii. 43[2].
merci, 417[1].

merito, 271², ii. 69¹.
mescolanza (dei colori), 196²; (binoculare), 197¹, ii. 87².
mesenchima, ii. 69².
meso-, ii. 70¹.
mesoblasto (*or* mesoderma), ii. 70¹.
mesoderma, ii. 70¹.
mesotelio, ii. 70².
messa, ii. 44¹.
Messia, ii. 70².
mestizia, 263².
metabolismo, ii. 71¹.
metacinesi, 601¹.
metafisica, ii. 72².
metagenesi, ii. 71².
metamero, ii. 71².
metamorfopsia, ii. 71².
metamorfosi, ii. 72¹.
metazoario, ii. 74¹.
metazoo, ii. 74¹.
metempirico, ii. 74².
metempsicosi, ii. 74².
metodi (dell' etica), ii. 76¹; (psicofisichi), ii. 392¹; (teoria dei), ii. 75¹.
metodo (introspettivo), 567²; (genetico), 409²; (analitico), 45¹; (economico), 306²; (delle differenze), 280²; (delle variazioni minime), 280²; (di esclusione), 356²; (grafico), 420¹; (euristico), 476²; (socratico), ii. 548²; (scientifico), ii. 500²; (di parola), ii. 821¹; (dei residui), ii. 467².
metodologia, ii. 75.
mezzadria, ii. 74¹.
mezzi, ii. 678²; (al fine), ii. 57¹.
mezzo, 328², ii. 56²; (termine), ii. 77².
microcefalo, ii. 77¹.
microcosmo, ii. 34¹.
microrganismo, ii. 77².
midolla (spinale), ii. 581¹.
mielite, ii. 124¹.
miglioramento, ii. 63¹.
migliorare, ii. 63¹.
migliorismo, ii. 62².
millennio (il), ii. 79¹.
mimesi, ii. 79.
mimetismo, ii. 79.
mimica, ii. 81².
mimico (linguaggio), 413¹.
minore, 542², ii. 37¹, 86¹.
minorenne, 542².
miopia, 124¹.
mira (punto di), 386¹; (linea di), ii. 8¹.
miracolo, ii. 86².
miscela, ii. 87².
miscredenza, ii. 724¹.
misericordia, ii. 69¹.
misfatto, ii. 38¹.
misologia, ii. 87¹.
misteri, ii. 124².
misticismo, ii. 124².
misto, ii. 87².
misurazione, ii. 57¹.
mito, ii. 126¹.
mitologia, ii. 126².
mitologica (teoria), ii. 126².
mitosi, ii. 87¹.
mnemonica, ii. 89¹.
mnemotecnica, ii. 89¹.
mobilità, ii. 89¹.
modalismo, ii. 89¹.
modalità, ii. 89².
modestia, ii. 93².
modificazione, ii. 94¹.
modo, ii. 103².
modulo, ii. 94¹.
mogigraphia, ii. 826².
molteplice (il), ii. 201¹.
moltiplicità, ii. 116².
moltitudine, ii. 117¹.
momento, ii. 98¹; (della forza), ii. 98¹.
monade, ii. 98¹.
mondo, ii. 118¹, 821²; (esterno, percezione del), 365²; (anima del), ii. 822¹.
monergismo, ii. 99².
moneta, ii. 99².
monismo, ii. 99².
mono-, ii. 101¹.
monoideismo, ii. 101¹.
Monofisiti, ii. 102¹.
monomania del dubbio, 296², ii. 101².
monopolio, ii. 102¹.
monoteismo, ii. 102¹.
monotelitismo, ii. 102².
Montanismo, ii. 103².
morale (teorie di), 343¹; (eteropsicologica), 476²; (idio-psicologica), 510¹, ii. 320¹; (facoltà), ii. 104¹; (pazzia), ii. 104¹; (giudizio), ii. 105¹; (progresso), ii. 105²; (senso), ii. 106¹; (statistica), ii. 106²; (teologia), ii. 110².
morali (teorie), 343¹; (scienze), ii. 106¹.
moralità, ii. 111¹; (istintiva), 556¹; (legale), ii. 111¹.
morboso, ii. 111².
morfologia, ii. 111².
morte, 256¹; (spirituale), 256².
mosche volanti, ii. 118².
mostra di sè, ii. 510¹.
mostro, ii. 103¹.
moti peristaltici, ii. 280².
motivo (affettivo), 21²; (economico), 307¹, ii. 113¹.
moto, ii. 111²; (e riposo), ii. 112²; (perpetuo), ii. 280².
motore, ii. 113².
movimenti (consentanei), 217²; (dell' occhio), 366¹.
movimento (illusioni di), 512²; ii. 113², 116¹.
muscolo, ii. 119¹.
musica, ii. 121².
mutazione, 171², ii. 122¹.
mutismo, ii. 123²; (psichico), 300¹.
mutuazione, ii. 124¹.

nano, 301².
narcosi, ii. 128¹.
narcotici, ii. 128¹.
nascente, ii. 128¹.
nativismo, ii. 129¹.
natività, ii. 132².
naturale, ii. 133¹.
naturalismo, ii. 137².
natura, ii. 138²; (morale), ii. 141²; (sensitiva), ii. 519¹; (stato di), ii. 599¹.
naturismo, ii. 142².
Nazareiti, ii. 142².
nazionale (ricchezza), ii. 128²; (carattere), ii. 128².
necessario, ii. 143²; (il), ii. 143¹.
necessità, ii. 143².
negativo, ii. 148¹.
negazione, ii. 146¹.
negligenza, ii. 149¹.
nemesi, ii. 149².
neo-, ii. 149²; (criticismo), ii. 149²; (Hegelianismo), ii. 149²; (Kantianismo), ii. 150¹; (Platonismo), ii. 150¹; (Pitagoreismo), ii. 150¹.
nervi vasomotori, ii. 759².
nervosismo, ii. 166².
nescienza, ii. 167².
nesso, ii. 176².
Nestoriani, ii. 167².
netto, ii. 167².
neuralgia, ii. 168¹.
neurasse, ii. 171¹.
neurastenia, ii. 168².
neurite, ii. 171¹.
neuroblasto, ii. 171².
neurologia, ii. 172¹.
neuromeri, ii. 175¹.
neurone, ii. 171², 175¹.
neuropatia, ii. 175².
neuropilema, ii. 175².
neuroporo, ii. 175².
neurosi, 175².
neurosismo, ii. 166².
neurotomi, ii. 175¹.
neutralità, ii. 176¹.
nichilismo, ii. 177².
ninfa, 182¹.
ninfomania, ii. 190².
nirvana, ii. 178¹.
nittalopia, ii. 177¹.
noetico, ii. 178².
noia, 327¹.
nolizione, ii. 179¹.
nome, ii. 127¹.
nominale, ii. 179².
nominalismo, ii. 180¹.
nomologia, ii. 180¹.
non compos sui, ii. 181¹.
non-essere, ii. 180¹.
non-io, ii. 181¹.
noologia, ii. 181², 183².
norma, ii. 182¹, 481²; (di fede), ii. 482¹.
normale, ii. 182², 183¹.
normalità, ii. 182¹.
normativo, ii. 182¹.
nota, ii. 43¹, 183².
notazione, 269².
notocorda, ii. 184².
nottambulismo, ii. 178².
nottambulo, ii. 177².
nous, ii. 185².
novazione, ii. 186¹.
noviziato, 63².
nozione, ii. 184¹; (di causa), 163²; (generale), 406².

nucleo, ii. 186[2].
nullo (esperimento di), ii. 404[1].
numeno, ii. 184[2].
numerale, ii. 190[1]; (schema), ii. 190[1].
numerico, ii. 190[1].
numero (-indice), 532[2], ii. 186[2]; (concetto di), ii. 189[1].
nutrizione, ii. 190[2].

obbiettivo, ii. 191[1], 192[2].
obbietto, ii. 191[1], 192[1].
obbligazione, ii. 194[1]; (morale), ii. 194[1].
obbligo, ii. 194[1], 111[1].
obiezione, ii. 192[2].
oblio, 390[2].
occasionalismo, ii. 199[2].
occhio (ciclopico), 251[1]; (movimenti dell'), 366[1]; ii. 769[2]; (misurazione ad), ii. 801[1]; (pineale), ii. 263[1]; (terzo), ii. 263[1].
occulto, 65[2], ii. 199[2].
odio, 442[2].
odore, ii. 489[1].
ofelimità, ii. 204[2].
offerta, ii. 623[2].
oftalmia, ii. 204[2].
oggetti esterni, 365[1].
oggettivismo, ii. 194[1].
oggetto, ii. 191[1].
oloblasto, 482[2].
ombra, 413[2].
omogamia, 483[2].
omogeneità, 483[2].
omolecito, 484[1].
omologhi (organi), 484[1].
omonimo, 484[1].
omotassi, 484[2].
omousia, 484[2].
onestà, 484[2]
onirologia, ii. 201[2].
onnipotenza, ii. 200[2].
onnipresenza, ii. 200 .
onniscienza, ii. 201[1].
onore, 484[2].
ontogenesi, ii. 202[1].
ontogenia, ii. 202[1].
ontologia, ii. 203[2].
ontologico (argomento), ii. 202[2].
ontologismo, ii. 203[1].
operazione di generalizzare, 408[1].
opere, ii. 821[2].
opinione, ii. 204[2].
opposizione, ii. 205[2]; (sociale), 537[2].
oracolo, ii. 212[1].
orda, 486[1].
ordinamento industriale, ii. 219[1].
ordinanza, ii. 212[2].
ordine, 419[2], ii. 212[1]; (morale), ii. 212[1].
ore di lavoro, 486[2].
orecchio, 443[1].
orfica (letteratura), ii. 250[1].
organi (analoghi), 40[2]; (elettrici), 313[1]; (omologhi), 484[1], ii. 212[2]; (vocali), ii. 802[2]; (dei sensi), ii. 517[2].
organica (selezione), ii. 213[2]; (sensazione), ii. 218[1].
organico, ii. 5[1], 213[1].
organismo, ii. 218[1]; (sociale), 537[2]; (unicellulare), 726[1].
organizzazione, ii. 219[1]; (sociale), ii. 537[2].
orgoglio, ii. 339[1].
orientazione, ii. 242[1]; (costante, legge di), ii. 242[2]; (illusione dell'), ii. 242[2].
originale, ii. 250[1]; (peccato), ii. 250[1].
originario, ii. 250[1].
origine (della vita), ii. 243[1]; (delle specie), ii. 243[2].
oroptero, 486[1].
ortodossia, ii. 250[2].
ortogenesi, ii. 250[2].
ortoplasia, ii. 251[1].
oscillazioni dell' attenzione. 387[1].
oscurantismo, ii. 198[1].
osservazione, ii. 198[1]; (interna), ii. 198[1]; (ordinamento dei risultati d'), ii. 198[2].
ossessione, 524[2], ii. 198[2].
ossi-, ii. 252[2].
otologia, ii. 251[2].
ottica, ii. 210[1].
ottimismo, ii. 210[2].
ovo, ii. 252[2].
oxi-, ii. 252[2].

pace, ii. 274[2].
padrone, 321[2].
paganesimo, ii. 253[1].
pagano, 453[1].
paleontologia, ii. 254[2].
palingenesi, ii. 254[2].
panenteismo, ii. 255[1].
pangenesi, ii. 255[1].
panlogismo, ii. 255[2].
panmissia, ii. 255[2].
panpneumatismo, ii. 256[1].
panpsichismo, ii. 256[1].
panteismo, ii. 256[2].
pantelismo, ii. 257[2].
Papa, ii. 309[2].
para-, ii. 258[1].
paradosso, ii. 258[1].
paralisi, ii. 259[1].
parallelismo psicofisico, ii. 258[1].
parallelogramma delle forze, ii. 259[1].
paralogismo, ii. 259[1].
parassito, ii. 262[2].
paresi, ii. 263[1].
parità, ii. 263[2].
parola interna, 564[1], ii. 569[1], 821[1].
parossismo, ii. 263[2].
parsimonia, ii. 264[1].
partenogenesi, ii. 264[1].
partito, ii. 266[2].
parusia, ii. 263[2].
parziale, ii. 265[2].
parziali (suoni), ii. 265[2].
passione, ii. 267[1].
passività, ii. 266[2].
passivo, ii. 266[2].
patente, 175[1].
patetico, ii. 268[1].
patimento, ii. 616[1].
patologia mentale, ii. 267[2].
patos, ii. 268[1].
patriarcato, ii. 268[2].
patristica (filosofia), ii. 268[2]; (dottrina), ii. 274[1].
patronimico, ii. 274[2].
patteggiare, 101[1].
paura, 375[2].
pazzia, 387[1], ii. 32[2], 34[2]; (circolare), 35[1], 550[1]; (morale), ii. 104[1].
peccabilità, ii. 274[2].
peccato, ii. 532[2]; (originale), ii. 250[1].
pedagogia, ii. 275[1].
pedagogica (psicologia), ii. 275[1].
peduncolo, ii. 275[1].
Pelagianismo, ii. 275[2].
pena, 431[1], ii. 397[1]; (teoria della), ii. 276[1].
penale, 244[1].
penitenza, ii. 276[1].
penologia, ii. 276[1].
pensiero, ii. 696[1]; (lettura del), ii. 120[1]; (selettivo), ii. 507[2]; (corrente del), ii. 604[2]; (trasmissione del), ii. 696[2].
Pentateuco, ii. 276[1].
pentimento, ii. 464[1].
percezione (della profondità), 270[2]; (del mondo esterno), 365[2], ii. 276[2]; (di posizione del corpo), ii. 311[1]; (di spazio), ii. 566[1].
perdizione, ii. 278[1].
perdono, ii. 262[2].
perfettibilità, ii. 278[2].
perfezione, ii. 278[2].
perfezionismo, ii. 279[1].
periodicità, ii. 279[2].
periodo (dei lumi), 326[2]; (latente), 628[2].
Peripatetici, ii. 280[1].
peristaltici (moti), ii. 280[2].
permanenza, ii. 280[2].
perpetuo (moto), ii. 280[2].
perseità, ii. 281[1].
perseveranza, ii. 282[1].
persistenza della sensazione, 24[1].
persona, ii. 282[2].
personale, ii. 283[1]; (equazione), ii. 283[1].
personalità, ii. 282[2]; (malattie della), ii. 284[2].
personificazione, ii. 286[1].
perspicuità, ii. 287[1].
perturbazione, ii. 287[1].
perversione, ii. 287[1].
pervertimento, ii. 287[1].
peso (sensazione di), ii. 812[2].
pessimismo, ii. 210[2].
piacere, ii. 253[1], 304[2].
piano, ii. 678[2]; (superiore), ii. 663[2].
pianta, ii. 302[2].
pieno (il), ii. 305[2].
pietà, ii. 69[1], 302[1].
pietismo, ii. 301[2].

pineale (ghiandola), 333[2]; (occhio), ii. 263[1].
Pirronismo, ii. 404[2].
pittoresco, ii. 301[1].
plasma, ii. 302[2]; (germinativo), 412[2].
plastica (imitazione), ii. 302[2].
plasticità, ii. 302[2].
plebaglia, ii. 89[1].
plenaria (indulgenza), ii. 305[1]; (inspirazione), ii. 305[1].
pleroma, ii. 305[2].
plesso (gangliare), 405[1], ii. 305[2]; (nervoso), ii. 306[1].
pluralismo, ii. 306[1].
pluralità, ii. 734[1]; (delle cause), ii. 306[2].
plus-valenza (-valore), ii. 625[2].
pneumatologia, ii. 308[1].
polemica, ii. 308[2].
poli-, ii. 309[1].
politica, ii. 309[1]; (economia), 307[1]; (filosofia), ii. 594[1].
polizia, ii. 308[2].
polso, ii. 397[1].
pompeggiarsi, ii. 510[1].
popolazione, ii. 309[2].
positiva (teologia), ii. 312[2].
positivismo, ii. 312[2].
positivo, ii. 311[2]; (diritto), ii. 312[1].
posizione (del corpo, percezione di), ii. 311[1]; (primitiva), 340[2].
possessione, ii. 313[1].
possesso della terra, ii. 675[1].
possibile, ii. 313[1].
possibilità, ii. 313[1].
postulato, ii. 316[1].
postume (categorie), ii. 315[2].
potenza, ii. 317[1], 318[2].
potenziale, ii. 316[2].
potere, ii. 318[2]; (coscienza di), ii. 319[2].
povertà, ii. 318[2].
prammatico, ii. 321[2].
prammatismo, ii. 321[2].
pratica, ii. 321[1]; (ragione), ii. 320[2]; (religione), ii. 321[1]; (teologia), ii. 321[1].
pratico, ii. 320[1]; (giudizio), ii. 320[1].
praxis, ii. 321[1].
precisione, ii. 323[2].
preciso, ii. 323[1].
precocità, ii. 324[1].
predestinazione, 390[1], ii. 325[1].
predeterminazione, ii. 325[1].
predicabile, ii. 325[1].
predicato, ii. 325[2].
predisposizione, ii. 329[2].
predizione, ii. 329[1].
preesistenza, ii. 330[1].
preformazione, ii. 330[1].
preghiera, ii. 323[1].
pregiudizio, ii. 324[1].
premessa, ii. 330[2].
premio, 125[1].
premonizione, ii. 331[1].
prendere (il), ii. 330[2].
preordinazione, ii. 331[2].
preparazione, ii. 331[2].
prepercezione, ii. 331[2].
preponderanza, ii. 331[2].
prerogativa reale, ii. 480[2].
presa, ii. 330[2].
presbiopia, ii. 332[1].
prescienza, 389[2].
prescrizione, ii. 332[1].
presentazione, ii. 333[1].
presentazionismo, ii. 333[2].
presente, ii. 333[1]; (tempo), ii. 333[1].
presentimento, ii. 331[1].
presocratica (filosofia), ii. 334[1].
pressione (sensazione di), ii. 337[1]; (punto di), ii. 337[1].
prestabilita (armonia), ii. 329[2].
presunzione, ii. 337[2].
presupposto, ii. 338[1], 624[2].
prete, ii. 340[1].
preterizione, ii. 338[1].
preternaturale, ii. 338[2].
prevaricazione, ii. 338[2].
prezzo, ii. 338[2].
primario, ii. 340[1].
primati, ii. 340[2].
primitiva (posizione), ii. 340[2].
primitivo, ii. 340[1].
primo, ii. 341[1].
primordiale, ii. 340[1].
principale, ii. 341[2].
principio (dell' economia), 309[1]; (del terzo escluso), 356[2], ii. 341[2]; (fondamentale), ii. 1[1].
priorità, ii. 342[1].
privato, ii. 343[1]; (diritto), ii. 343[2].
privazione, ii. 343[2].
privilegio, 394[1], ii. 343[2].
probabile (illazione), ii. 353[2].
probabilismo, ii. 344[1].
probabilità, ii. 344[1].
problema, ii. 355[2].
problematico, ii. 355[2].
procedura, ii. 356[1].
processo, ii. 356[1]; (psichico *or* mentale), ii. 356[1]; (sociale), ii. 538[2].
procura, 24[2].
prodotto, ii. 471[1]; (crescente), 529[2].
prodromi, ii. 357[1].
produttività, 311[1]; (decrescente), 281[2].
produzione, ii. 357[1]; (eccesso di), ii. 252[1].
profezia, ii. 361[1].
profitto, ii. 357[2]; (decrescente), 281[2].
profondità (percezione della), 270[2].
progetto di legge, 117[1], ii. 358[2], 678[2].
prognatia, ii. 357[2].
prognatismo, ii. 357[2].
progressivo, ii. 358[1].
progresso, ii. 358[1]; (morale), ii. 105[2]; (sociale), ii. 535[2].
projezione (eccentrica), 304[2], ii. 358[2].
proliferazione, ii. 359[1].
propensione, ii. 359[2].
propiziazione, ii. 361[1].
proporzione, ii. 361[1].
proposito, ii. 404[1], 678[2].
proposizione, ii. 361[2]; (subalterna *or* subordinata), ii. 726[1].
propria (luce) della retina, 510[1].
proprietà, ii. 359[2], 360[1]; (diritto di), ii. 360[2].
proprio (interesse), ii. 510[1].
prosillogismo, ii. 370[2].
prosodia, ii. 370[2].
prosperità, ii. 813[1].
prostrazione, ii. 370[2].
protanopia, ii. 370[2].
protasi, ii. 371[1].
protestantismo, ii. 372[2].
protettiva (rassomiglianza), ii. 371[2].
protezione, ii. 371[1].
protezionismo, ii. 371[1].
protista, ii. 372[2].
protoplasma, ii. 372[2].
protozoo, ii. 373[1].
prova, 351[2], ii. 359[1], 682[1]; (tempo di), ii. 355[2].
provvidenza, ii. 373[1].
provvisionale, ii. 373[1].
prudenza, ii. 374[1].
pseudestesia, ii. 374[2].
pseudo-, ii. 374[2].
psiche, ii. 374[2].
psichiatria, 331[1], ii. 375[2].
psichico (sviluppo), 433[1], ii. 376[1].
psico-, ii. 382[1].
psicofisica, ii. 392[2].
psicofisichi (metodi), ii. 392[1].
psicofisico (parallelismo), ii. 258[1].
psicofisiologia, ii. 390[1].
psicogenesi, ii. 382[1].
psicogenìa, 410[1].
psicogenico, ii. 382[2].
psicologia, ii. 382; (morbosa *or* patologica), 2[2]; (animale), 48[1]; (biblica), 116[1]; (della fanciullezza, del bambino), 175[1]; (comparata), 201[2]; (etnica), 387[2]; (genetica), 410[1]; (individuale), 538[2]; (medica), ii. 60[1]; (variazionale), ii. 759[1]; (pedagogica), ii. 275[1]; (empirica, razionale), ii. 389[1]; (sperimentale, ii. 389[1]; (fisiologica), ii. 390[1]; (la nuova), ii. 391[1]; (delle razze), ii. 414[1]; (sociale), ii. 538[2].
psicologico, ii. 376[1]; (sofisma), ii. 382[2].
psicologismo, ii. 382[2].
psicometria, ii. 391[1].
psicomotore (-torio), ii. 391[2].
psiconomia, ii. 391[2].
psicopatologia, ii. 391[2], 267[2].
psicosi dello sviluppo, 275[1], ii. 392[2].
psicoterapeutica, ii. 394[2].
pubblico, ii. 396[1]; (diritto), ii. 396[2].
pubertà (psicosi della), 275[1], ii. 396[1].
punizione, ii. 397[1], 401[1].
punti (corrispondenti), 237[2]; (identici), 504[1]; (termici), ii. 673[1]; (barici), ii. 337[1]; (di dolore *or* algesici), ii. 254[2].

punto, ii. 308[1]; (cieco), 121[2]; (cardinale), 155[1]; (di freddo), 193[1]; (di mira), 386[1]; (termico di calore), 453[1]; (d'in differenza), 533[1]; (di pressione), ii. 337[1]; (di sensibilità al freddo e al caldo), ii. 673[1].
purezza, ii. 403[1].
purgatorio, ii. 402[2].
purità, ii. 403[1].
Puritanismo, ii. 403[1].
Purkinje (immagini di), ii. 403[2]; (fenomeno di), ii. 403[2].
puro, ii. 401[2].

qualche, ii. 555[2].
qualità, ii. 359[2], 406[1]; (mentale), ii. 409[1].
quantità, ii. 409[2]; (intensiva), 559[2].
questione, 576[2].
quiddità, ii. 412[2].
quietismo, ii. 412[2].

rabbia, ii. 413[1].
Rabbinismo, ii. 413[1].
radiazione, ii. 414[2].
radice, ii. 414[2], 479[2].
raffrenamento, ii. 469[2].
raggio di direzione, ii. 417[1].
ragionamento, ii. 426[1].
ragione, 432[1], ii. 424[2], 425[2]; (pratica), ii. 320[2]; (sufficiente, legge della), ii. 616[1]; (intendimento e), ii. 725[2].
ragionevole, ii. 426[1].
rammarico, ii. 438[2].
rapporto, ii. 415[1], 439[2]; (magnetico), ii. 415[1].
rappresentare, ii. 464[2].
rappresentazione, 498[1], 518[1], ii. 464[2].
rappresentazionismo, ii. 464[2].
rassegnazione, ii. 468[1].
rassomiglianza, ii. 6[1]; (protettiva), ii. 371[2].
razionale, ii. 415[1].
razionalismo, ii. 415[2].
razza, ii. 413[2].
razze (psicologia delle), ii. 414[1].
reale, ii. 420[1]; (prerogativa), ii. 480[2].
reali, ii. 424[2].
realismo, ii. 421[2]; (naturale), ii. 134[1]; (idealistico), ii. 421[2].
realtà (sentimento della), ii. 424[2].
reattivo, ii. 420[1].
reazione (anticipata), 56[1]; (cattolica), 162[2], ii. 417[1]; (tempo di), ii. 417[1].
recettibilità, ii. 429[2].
reciproca (domanda), ii. 429[2].
reciprocità, ii. 429[2].
Redentore, ii. 434[1].
redenzione, ii. 434[1].
re-filosofo, ii. 290[1].
regola, ii. 481; (d'oro), 416[1]; (di fede), ii. 482[1].
regolare, ii. 439[1].
regressione, ii. 438[1].
regresso (e decadenza) sociale, ii. 538[2].
reintegrazione di Jackson, 577[1]; ii. 434[1].
relativi (termini), ii. 447[2].
relatività, ii. 450[1]; (della conoscenza), ii. 450[2]; (legge di), ii. 450[2].
relativo, ii. 443[2].
relazione, ii. 439[2]; (legge di), ii. 450[2].
religione, ii. 452[1]; (naturale), ii. 134[1]; (pratica), ii. 321[1]; (filosofia della), ii. 454[1]; (dell' umanità), ii. 462[1]; (vedica), ii. 760[1].
religiosa (coscienza), ii. 462[2].
religioso (istinto), ii. 462[2].
reminiscenza, ii. 463[1].
remissione dei peccati, ii. 463[1].
residui (metodo dei), ii. 467[2].
residuo, ii. 707[2].
resistenza, ii. 468[1]; (sensazione di), ii. 468[1].
responsabile, 9[1].
responsabilità, ii. 468[2].
retaggio, 546[2].
retina, ii. 470[2]; (reazione oscillatoria della), ii. 470[2].
retribuzione, ii. 471[1].
rettitudine, ii. 433[1].
rettorica, ii. 473[1].
reverie, ii. 472[1].
reversione, ii. 472[1].
reviviscenza, ii. 472[2].
ricapitolazione (leggi di), ii. 428[2].
ricchezza, ii. 811[1]; (nazionale), ii. 128[2].
ricognizione, ii. 430[1]; (segni di), ii. 432[2].
ricompensa, ii. 472[2].
riconoscenza, 421[1].
riconoscimento, ii. 430[1].
ricordanza, ii. 430[2].
ricordarsi, ii. 463[1].
ricordi (fissarsi dei), 386[1].
ricorrente, ii. 433[1]; (visione), ii. 433[1].
ricuperamento, ii. 433[1].
riduttiva (divisione), ii. 435[2].
riduzione, ii. 434[2].
riflessione, ii. 435[2], 436[1].
riflessivo, ii. 436[1].
riflesso (patellare), 602[1]; (rotuleo), 602[1]; (cosciente), ii. 436[1]; (atto), ii. 436[2].
Rifqrma, ii. 437[2].
rifrazione, ii. 437[2].
rigenerazione, ii. 437[2].
rigidità, ii. 475[1].
Rigoristi (-ismo), ii. 475[1].
rimorso, ii. 463[1].
Rimostranti, ii. 463[1].
rimoto, ii. 463[2].
rinascimento, ii. 463[2].
ringiovanimento, ii. 439[2].
riposo, ii. 464[1], 469[2].
riproduzione, ii. 465[2]; (agamica), 24[1]; (fedeltà di), 381[2]; (sessuale), 404[2], ii. 525[1].
riprovazione, ii. 465[1].
ripugnanza, ii. 466[1].
ripulsione, 89[2].
risentimento, ii. 467[2].
risoluzione, ii. 468[2].
rispetto, ii. 468[2].
risponsabilità, ii. 8[2].
risultante, ii. 470[1]; (suono), ii. 470[1].
risultato, ii. 470[1], 471[1].
risurrezione, ii. 470[1].
ritenere (il), ii. 470[2].
ritenzione, ii. 470[2].
ritmo, ii. 473[1].
rituale, ii. 476[1].
rivalità, ii. 476[1].
rivelazione, ii. 471[2].
riverenza, ii. 472[1].
Romano (diritto), ii. 478[1].
romantico, ii. 479[1].
rossore, 123[2].
rotazione (sensazione *or* percezione di), ii. 480[1].
rudimento, 49[2], ii. 481[1].
ruina, ii. 481[1].
rumore, ii. 179[1].

sabatismo, ii. 483[1].
Sabellianismo, ii. 483[1].
sacerdotalismo, ii. 483[2].
sacramento, ii. 483[2].
sacre scritture, ii. 484[1], 503[2].
sacrificio, ii. 484[1]; (di sè), ii. 509[1].
Sadduceismo, ii. 484[1].
saggio, ii. 682[1].
salario, ii. 810[1].
salto, ii. 484[2].
salute (dell' anima), ii. 484[2]; (della mente), ii. 487[2].
Salvatore, ii. 488[2].
salvazione, ii. 484[2].
sangue, 123[2].
sanguigno, ii. 487[1].
sanità, ii. 487[2].
santificazione, ii. 485[1].
santità di Dio, 482[2].
sanzione, ii. 485[2].
sapienza, ii. 818[2].
sapori, ii. 662[2].
Satana, ii. 487[2].
saturazione, ii. 488[1].
Savii (i sette), ii. 818[2].
scala ternaria di Porferio, ii. 714[1].
scale di Snellen, ii. 686[1].
scambio, 356[1]; (mutuo), ii. 429[2].
scelta, 176[1], ii. 504[2].
scemo, 388[1].
scetticismo, ii. 489[1].
schema, ii. 490[2]; (numerale), ii. 190[1].
schematismo, ii. 490[2].
schiavitù, ii. 522[1].
Schopenhauerismo, ii. 499[1].
sciamanismo, ii. 525[2].
scientifico (metodo), ii. 500[2].
scienza (comparata delle religioni), 201[2], ii. 499[1]; (fisica), ii. 300[1].
scienze (morali), ii. 106[1]; (sociali), ii. 539[2].
scimunito, 388[1].
scintillamento, 386[2].
scintillio, 386[2].
scisma, ii. 491[2].
scissiparità, 384[1].

scissura, 384².
sclerosi, ii. 503¹.
scolastica (la), ii. 491².
Scolastici (teologia degli), ii. 495².
scomunica, 357¹.
sconto, 284¹.
scoperta, 284².
scopo, 28¹, 323².
Scotismo, ii. 503².
scrittura, 440² ; (automatica), 94² ; (a specchio), ii. 86², 503².
scritture (sacre), ii. 484¹.
scrupolo, ii. 503².
scuola (Alessandrina), 30² ; (normale), ii. 183¹.
scuole (filosofiche dei Greci), ii. 495².
sè (sentimento di), ii. 508² ; (coscienza di), ii. 509¹ ; (conoscenza di), ii. 510² ; (sacrificio di), ii. 509¹ ; (amor di), ii. 510² ; (giustificazione di), ii. 512² ; (mostra di), ii. 510¹.
se-oggetto, 312¹.
se-soggetto, 312¹.
secolo dei lumi, 326².
secrezione, ii. 504¹.
segmentazione, 189¹, ii. 504².
segni (locali), ii. 15¹ ; (premonitori), ii. 331¹ ; (di riconoscimento), ii. 432².
segno, 527², ii. 43¹ ; (temporale), ii. 673².
segregazione, 576².
selettivo (il pensiero), ii. 507².
selezione, ii. 504², 506² ; (artificiale), 74¹ ; (metodica), 74¹ ; (germinale), 412¹ ; (di gruppo), 433¹ ; (individuale), 538² ; (interna), 565² ; (naturale), ii. 134² ; (organica *or* indiretta), ii. 213² ; (fisiologica), ii. 300² ; (genetica), ii. 465² ; (sessuale), ii. 525¹ ; (sociale), ii. 540¹.
selvaggio, ii. 488¹.
selvatico, ii. 488¹, 815².
semantica, ii. 513¹.
sembianza, ii. 513¹.
semi-pelagianismo, ii. 514².
semituono, 181¹.
semplice, ii. 127¹, 531¹.
semplicità di spirito, 377¹, ii. 532¹.
senescenza, ii. 514².
senilità, ii. 514².
sensazione (delle giunture), 73² ; (di luce (*or* luminosa) acromatica), 146² ; (di colore), 197¹ ; (organica, generale), 199² ; (concomitante, associata), 209¹ ; (di contatto), 222² ; (cutanea), 250², 271¹ ; (di sforzo *or* di tensione), 311² ; (uditiva), 451¹ ; (della rogna), 576² ; (luminosa), ii. 6¹ ; (negativa), ii. 149¹ ; (organica *or* diffusa), ii. 218¹ ; (muscolare), ii. 121¹ ; (tattile, del tatto), ii. 707¹ ; (di dolore), ii. 254¹ ; (di pressione), ii. 337¹ ; (barica), ii. 337¹ ; (di stiramento), ii. 397¹ ; (ampiezza della), ii. 415¹ ; (di resistenza), ii. 468¹ ; (di rotazione), ii. 480¹ ; (di ruvidità *or* liscio), ii. 480¹ ; (sessuale), ii. 525² ; (di peso), ii. 812² ; (cutanea), ii. 533¹ ; (statica), ii. 600² ; (muscolare di tensione), ii. 604¹ ; (tendinea), ii. 674² ; (termica *or* della temperatura), ii. 673¹.
sensazioni (olfattive), ii. 200² ; (gustative), ii. 662² ; (subiettive), ii. 610².
sensi (illusione dei), ii. 517² ; (organi dei), ii. 517².
sensibilità, 19², ii. 517², 519¹ ; (articolare *or* delle giunture), 580¹ ; (disturbi della), ii. 517² ; (di differenza *or* distintiva), ii. 517¹.
sensismo, ii. 515².
sensitività, ii. 519¹.
sensitivo (circolo), ii. 519².
senso, ii. 515² ; (comune), 200¹ ; (di differenza), 280¹ ; (dell'equilibrio), 338¹, ii. 57¹ ; (morale), ii. 106¹ ; (spirituale), ii. 517¹.
senso-motorio, ii. 519².
sensoriale, ii. 519².
sensorio, ii. 519² ; (comune), ii. 519².
sensuale, ii. 520².
sensualismo, ii. 520¹.
sentimentalità, 21², ii. 521¹.
sentimento, 377¹ ; (di sforzo *or* di tensione), 311² ; (dello sforzo mentale), 311² ; (di congruità), 384² ; (della libertà), 396¹ ; (del futuro), 399² ; (fondamentale dell'io organico), 218¹ ; (di sè), ii. 508¹ ; (estetico), ii. 521² ; (sessuale), ii. 525¹ ; (della realtà), ii. 424².
serie, ii. 521².
servigi, ii. 522¹.
servitù, ii. 523¹.
sesso, ii. 523².
sessuale (riproduzione), 404², ii. 525¹ ; (selezione), ii. 525¹ ; (sentimento), ii. 525¹.
sessuali (caratteri), ii. 524¹.
setta, ii. 504¹.
Settanta (versione dei), ii. 521².
sezione aurea, 416¹.
sforzo (sensazione di), 311².
sguardo (campo di), 381² ; (linea di), ii. 527².
sibillini (i libri), ii. 527¹.
significato, 526¹, ii. 528¹.
significazioni (teoria delle), ii. 529¹.
sillogismo, ii. 628².
simboli, ii. 651².
simbolica, ii. 640¹ ; (logica), ii. 640².
simbolico, ii. 651¹.
simbolismo ii. 651¹.
simbolo, ii. 640¹ ; (di Atanasio), 84¹.
similare, ii. 530².
simmetria, ii. 651².
simpatia, ii. 652¹ ; (estetica), ii. 653¹.
simulazione, ii. 532¹.
sin-, ii. 654¹.
sincerità, ii. 532².
sincope, ii. 655².
sincretismo, ii. 655².
sinderesi, ii. 655².
sinergia, ii. 658¹.
sinergismo, ii. 657².
sinestesia, ii. 654¹.
singolare, ii. 533¹.
singolarismo, ii. 533¹.
singolo, ii. 533¹.
sintesi, ii. 658² ; (chimica), 175¹ ; (mentale), ii. 658².
sintetica (filosofia), ii. 659¹.
sintetico, ii. 658².
sintomo, ii. 653².
sistema, ii. 659¹ ; (nervoso), ii. 153² ; (mercantile), ii. 68² ; (vasomotore), ii. 760¹.
sistematica (teologia), ii. 659².
sociabilità, ii. 543¹.
sociale (volontà), 407¹ ; (coscienza), ii. 534¹ ; (contratto), ii. 534² ; (dinamica), ii. 534² ; (etica), ii. 535¹ ; (forza), ii. 537¹ ; (logica), ii. 537¹ ; (opposizione), ii. 537² ; (organismo), ii. 537² ; (organizzazione), ii. 537² ; (filosofia), ii. 538² ; (processo), ii. 538² ; (psicologia), ii. 538² ; (regresso e decadenza), ii. 538² ; (statica), ii. 540¹ ; (tessuto), ii. 541¹ ; (unità), ii. 541¹ ; (individuo), ii. 548².
sociali (evoluzione e progresso), ii. 535² ; (scienze), ii. 539² ; (selezione ed eliminazione), ii. 540¹.
socialismo, ii. 541².
socialità, ii. 543¹ ; (sviluppo della), ii. 543¹.
società, ii. 543² ; (operaia), ii. 708¹.
Sociniani, ii. 544¹.
sociologia, ii. 544¹.
socionomia, ii. 548².
Socratica (filosofia), ii. 549¹.
Socratico (metodo), ii. 548².
soddisfazione, ii. 487².
sofisma, 372², ii. 556¹ ; (psicologico), ii. 382².
Sofisti, ii. 556².
sofistica, ii. 556².
soggettivismo, ii. 611¹.
soggettivo, ii. 607¹.
soggetto, ii. 607¹.
soglia, ii. 696².
sogno, 297¹.
solidarietà, ii. 553¹.
solipsismo, ii. 553¹.
solletico, ii. 697¹.
soluzione, ii. 554².
somatologia, ii. 555¹.
somatopleura, ii. 555¹.
somiglianza, ii. 6¹.
somma degli stimoli, ii. 620¹.
Sommisti, ii. 620².
sonnambulismo, ii. 555².
sonno, ii. 533¹.

soppressione, ii. 611[1].
sopralapsarianismo, ii. 625[2].
soprannaturale, ii. 623[1].
sopraproduzione, 355[2].
sopravvivenza, ii. 472[1]; (del più adatto), 385[2].
soprumano, ii. 623[1].
sordità, 254[2]; (mentale *or* psichica), 255[2], ii. 625[2]; (musicale), ii. 705[2].
sordo, 254[2].
sordomutismo, 254[1].
sorite, 171[2], ii. 557[1].
sostanza, ii. 612[1], 614[1]; (vivente), ii. 8[2].
sostituzione, ii. 614[2].
soteriologia, ii. 557[1].
sovranità, ii. 558[1]; (di Dio), ii. 559[1].
spasmo, ii. 566[2].
spazializzazione, ii. 566[1].
spazio, ii. 559[1]; (percezione di), ii. 566[1].
specie, 600[1], ii. 566[2]; (origine delle), ii. 243[2].
specifica (energia), ii. 567[2]; (gravità), ii. 567[2].
specificazione, ii. 567[2].
speculazione, ii. 568[2].
speranza, 485[2].
sperimentare (lo), 362[2].
sperma, ii. 580[2].
spermatica (cellula), ii. 580[2].
spermatogenesi, ii. 580[2].
spesa, 360[2].
spese non ripartite, 579[2].
spettro, ii. 568[1].
Spinozismo, ii. 584[2].
spiritismo, ii. 585[2].
spirito (di corpo), 217[1], 341[1]; (santo), 482[2], ii. 81[2], 584[2], 818[2].
spirituale, ii. 587[1]; (senso), ii. 517[1].
spiritualismo (teoria dello), ii. 557[2].
spiritualità, ii. 587[1].
spirometro, ii. 587[1].
splancnopleura, ii. 587[1].
spongioblasto, ii. 587[2].
spontanea (generazione), ii. 587[2].
spontaneità, ii. 587[2].
spora, ii. 588[1].
spurio, ii. 374[2].
stabilità, ii. 592[2].
stanchezza, 628[1].
stati mentali, ii. 614[2].
statica, ii. 601[1]; (sociale), ii. 540[1]; (economia), ii. 600[1]; (sensazione), ii. 600[2].
statistica, ii. 601[1]; (morale), ii. 106[2].
stato, ii. 593[2]; (agricolo), 28[1]; (di guerra), 113[2]; (finale), 324[2]; (ipnotico), 490[1]; (intermedio), 563[2], ii. 593[1], 601[2]; (di coscienza), ii. 598[2]; (di natura), ii. 599[1]; (incosciente *or* inconscio), ii. 725[1].
statuto, ii. 601[2].
stenico, ii. 603[1].
stereoscopica (visione), ii. 602[1].
sterilità, ii. 602[2].
stile, ii. 605[2].
stimate, ii. 603[1].
stimolante, ii. 603[1].
stimoli (addizione *or* somma degli), ii. 620[1].
stimolo, 575[2]; (normale), ii. 183[1], 603[2].
stiramento (sensazione di), ii. 397[1].
stirpe, ii. 603[2].
stoicismo, ii. 604[1].
storia, 477[1]; (filosofia della), 477[2]; (della filosofia), 480[1]; (naturale), ii. 133[2].
strabismo, ii. 604[1].
straniarsi (lo), ii. 509[2].
straniero, 389[2].
strapazzo, 374[2].
stregoneria, ii. 557[1], 818[2].
strumenti, 605[1].
struttura, ii. 604[2].
studii formali, 391.
stupidità, ii. 605[1].
stupore, ii. 605[1].
sub-, 491[1].
subalterna proposizione, ii. 726[1].
subalternazione, ii. 606[1].
subconscio, ii. 606[1].
subcontrario, ii. 607[1].
subcosciente, ii. 606[1].
subiettive (sensazioni), ii. 610[2].
sublime, ii. 611[2].
subordinazione, ii. 612[1].
subsunzione, ii. 615[1].
successione, ii. 615[1].
succubo, ii. 615[2].
sudditanza, 33[2].
sufficiente (ragione), legge della, ii. 616[1].
Sûfismo, ii. 617[2].
suggestione, ii. 619[1].
suicidio, ii. 620[1].
Sumniti, ii. 621[1].
suoni parziali, ii. 265[2].
suono, 184[2], 449[2], ii. 183[2], 705[2]; (di battimento), 104[1]; (di combinazione), 198[1]; (composto), 205[2]; (di differenza), 281[1]; (fondamentale), 397[2], ii. 341[1]; (asprezza del), 442[2]; (risultante), ii. 470[1]; (addizionale), ii. 620[2]; (d' intermittenza), 563[2]; (musicale), ii. 122[1].
supererogazione, ii. 622[2].
superficie, ii. 625[2].
superstizione, ii. 623[2].
supposizione, ii. 624[2].
suprema (felicità), 422[1], ii. 707[1].
sussidio, ii. 612[1].
sussistenza, ii. 612[1].
sustanzialismo, ii. 614[1].
svenimento, ii. 628[1].
sviluppo, 274[2]; (legge di Baer dello), 100[1]; (mentale), 354[2]; (psichico *or* mentale), 433[1], ii. 67[1]; (della socialità), ii. 543[1].
svolgimento della propria personalità, ii. 512[2].

tabe, ii. 660[1].
tabù, ii. 660[1].
Talmud, ii. 661[2].
Tartini (fenomeno del), 281[1].
tassazione, ii. 663[1].
tassonomia, ii. 663[2].
tattile (campo), 382[1]; (sensazione), ii. 707[1].
tatto (teoria del), 441[1].
tautologia, ii. 663[1].
tavoletta, ii. 302[2].
teismo, ii. 688[1].
telegonia, ii. 663[2].
teleologia, ii. 664[1].
teleologico (argomento), ii. 663[2].
telepatia, ii. 668[1].
tema, ii. 691[2].
temperamento, ii. 672[2].
temperanza, ii. 672[2].
temperatura (sensazione della), ii. 673[1].
tempo, ii. 697[2]; (presente), ii. 333[1]; (di prova), ii. 355[2]; (di reazione), ii. 417[1]; (senso del), ii. 705[1].
tempo passato (coscienza del), ii. 267[2].
temporale, ii. 673[2]; (segno), ii. 673[2].
tendenza, 207[1], 529[1], ii. 674[2].
tendinea (sensazione), ii. 674[2].
tensione (sensazione di), 311[2], ii. 604[1].
tentazione, ii. 674[2].
teocrasia, ii. 692[1].
teodicea, ii. 692[1].
teofania, ii. 693[1].
teologia (pastorale), 60[2]; (biblica), 116[2], ii. 692[2]; (naturale), ii. 137[2]; (morale), ii. 110[2]; (positiva), ii. 312[2]; (pratica), ii. 321[1]; (degli scolastici), ii. 495[2]; (sistematica), ii. 659[2]; (dommatica), ii. 693[1].
teorema, ii. 693[1].
teoria, ii. 693[1]; (dell'interazione), 168[1]; (cellulare), 169[1]; (di Copernico), 234[2]; (dell'alleanza), 240[1]; (della discendenza), 271[2]; (del doppio aspetto), 295[1]; (degli errori), 340[1]; (della gastrea), 405[2]; (del tatto), 441[1]; (degl' elementi psichici), ii. 85[2]; (della materia psichica), ii. 86[1]; (dei metodi), ii. 75[1]; (mosaicistica della visione), ii. 111[2]; (delle significazioni), ii. 529[1]; (dello spiritualismo), ii. 557[2]; (mitologica), ii. 126[2]; (Tolemaica), ii. 396[1].
teorie morali *or* di morale, 343[1].
teosofia, ii. 695[1].
teratologia, ii. 675[2].
termica (sensazione), ii. 673[1].
termici (punti), ii. 673[1].
terminazione nervosa, 324[1].
termine (generale), 407[1]; (medio), ii. 77[2]; 676[1].
termini relativi, ii. 447[2].
terra, 618[1]; (valore della), 618[1]; (possesso della), ii. 675[1].
terzo occhio, ii. 263[1].
terzo escluso (principio del), 356[2].

tesi, ii. 695[1].
tessuto, ii. 705[2]; (sociale), 541[1].
testamento, ii. 817[2], 686[1].
testimonianza, ii. 686[1].
tetano, ii. 687[2].
ticchio, ii. 696[2].
timbro, 195[1], ii. 697[1].
timidità, ii. 526[2]; (istintiva), 102[2].
timore, 375[2].
tinta, 197[1].
tipi (di prova ottica), ii. 686[1]; (mentali), ii. 721[2].
tipo divino, 290[1], ii. 721[1].
Tolemaica (teoria), ii. 396[1].
tollerantismo, 639[2].
Tomismo (il), ii. 696[1].
tonale (sordità), ii. 705[2].
tonica, ii. 706[1]; 397[2].
tonico, ii. 706[1].
tono sentimentale, 23[1]; (di battimento), 104[1]; (d' intermittenza), 563[2]; (musicale), ii. 122[1]; (armonico), ii. 252[2].
torpore, 300[1].
torto, ii. 706[1], 826[2].
totem (-ismo), ii. 706[2].
traccia, ii. 707[2].
tradimento (alto), 476[2].
tradizione, ii. 708[2].
traducianismo, ii. 709[1].
traduzione, ii. 712[1].
tragico, ii. 709[1].
'trance,' ii. 709[2].
transeunte, ii. 712[1].
transmigrazione, ii. 74[2].
transubbiettivo, ii. 713[1].
transustanziazione, ii. 713[2].
trapano, ii. 714[2].
trascendentalismo, ii. 623[1], 711[1].
trascendente, ii. 710[2].
trascendenza, ii. 710[2].
trasformazione, ii. 711[2].
trasformismo, ii. 712[1].
trasgressione, ii. 712[1].
trasmissione, ii. 713[2]; (del pensiero), ii. 696[2].
trasposizione, ii. 713[1].
Trattarianismo, ii. 707[2].
traumatismo, ii. 713[2].
tremore, ii. 714[2].
treteismo, ii. 715[2].
triangolo dei colori, 197[2].
tribù, ii. 715[1].
tricotomia, ii. 715[1].
trilemma, ii. 715[1].
Trinità, ii. 715[2].
trinitarianismo, ii. 715[2].
tristezza, 263[2], ii. 557[1].
trofismo, ii. 716[1].
tropismo, ii. 716[2].
tutto, 33[2], ii. 714[1].

ubbidienza, ii. 191[1].
ubbriachezza, 297[2], 540[2].
ubiquità, ii. 723[1].
uditiva (sensazione), 451[1].
udito, 443[1]; (difetti dell'), 452[1].
udizione (colorata), 91[1]; (binauricolare), 117[2].
ultimo, ii. 723[2].
ultramontanismo, ii. 724[1].
umanesimo, 486[2].
umanismo, 486[2].
umanità, ii. 41[1]; (religione dell'), ii. 462[1].
umiliazione di Cristo, 487[2].
umiltà, 487[2].
umor nero, 123[2].
umore, ii. 103[2]; (buon), 488[1].
umorismo, 488[1].
uniformità, ii. 127[1]; (di natura), ii. 726[2].
unione ipostatica, 492[1].
unisono, ii. 731[2].
unità (sociale), 541[1], ii. 731[2], 734[1], 736[2]; (della coscienza), ii. 68[1]; (di Dio), ii. 737[1]; (metodica), ii. 76[2].
unitarianismo, ii. 734[1].
universale, ii. 738[1].
universalismo, ii. 741[2].
universalità, ii. 742[1].
universo, ii. 742[1]; (fondamento dell'), ii. 822[1].
uno (l'), ii. 201[1].
uomo, ii. 39[1].
uovo, ii. 252[2].
uso, 250[1], ii. 744; (ereditarietà dall'), ii. 744[2].
usufrutto, ii. 744[2].
usura, ii. 745[1].
utilità, 360[1]; (finale), 383[1]; ii. 745[2].
utilitarismo (-isti), ii. 745.
Utopia, ii. 745[2].

vacuo, ii. 747[1].
vago, ii. 748[1].
validità, ii. 748[2].
valore (cardinale), 155[1]; (intrinseco), 566[1], ii. 747[2], 822[2].
vangelo, 417[1].
vanità, ii. 339[1].
variabile, ii. 750[2].
variazionale (psicologia), ii. 759[1].
variazione negativa, ii. 149[1].
variazioni (di coincidenza), 193[1]; (minime, metodo delle), 280[2], ii. 750[2].
varietà, ii. 736[2], 759[1].
vasomotore (centro), ii. 759[2]; (nervo), ii. 759[2]; (sistemo), ii. 760[1].
vedica (religione), ii. 760[1].
velocità, ii. 760[2].
vendetta, ii. 471[2], 760[2].
ventricolo, ii. 760[2].
ventriloquio, ii. 760[2].
veracità, ii. 761[1].
verbale, ii. 761[2].
Verbo (Il), ii. 30[2].
vergogna, ii. 525[2].
verificazione, ii. 761[2].
verità, ii. 716[2]; (fondamentale), 397[2]; (criterio della), ii. 687[1]; (di Dio), ii. 720[2].
vertebrato, ii. 762[1].
vertice, ii. 762[1].
vertigine, 291[1], ii. 762[1].
vescicola germinativa, 412[2].
vescicole cerebrali, 170[2].
vestigio, ii. 763[1].
vibrazione, ii. 763[1].
virtù cardinali, 155[1], ii. 764.
virtuale, ii. 763[2].
virtualità, ii. 317[1].
visione (indiretta), 533[2], ii. 765[1]; (ricorrente), ii. 433[1]; (stereoscopica), ii. 602[1]; (interna), ii. 801[2].
visivo (campo), 382[1].
vista (binoculare), 117[2]; (doppia), 296[1]; (corta), ii. 142[2].
visuale (linea), ii. 8[1].
vita (lotta per la), 358[1]; (spirituale), ii. 5[1], 6[1]; (origine della), ii. 243[1], 801[2].
vitalità, ii. 801[2].
vivacità, ii. 802[1].
vivezza, ii. 802[1].
vizio, ii. 763[2].
voce, ii. 806[1].
volitivo, ii. 806[2].
volizione, ii. 806, ii. 678[2].
volontà, ii. 678[2]; (sociale *or* collettiva), 407[1]; (disturbi di), ii. 816[2]; (di credere), ii. 806[1], 808[1], 815[2].
volontario, ii. 809[2].
volontarismo, ii. 807[1].
vudù, ii. 809[1].
Vulgata, ii. 809[2].
vuoto, ii. 747[1].

Weismannismo, ii. 812[2].
Westminster (Confessione di), ii. 813[2].

xenia, ii. 827[1].

Zend-Avesta, ii. 827[1].
zona, ii. 828[1].
zooteismo, ii. 828[1].
Zoroastrismo, ii. 828[2].

OXFORD: HORACE HART, PRINTER TO THE UNIVERSITY

48313